

'NOS'IA '8 'f

J. S. WILSON

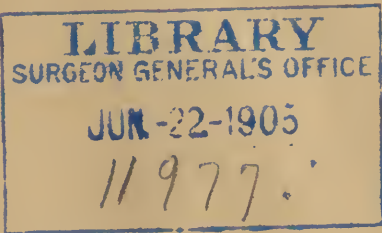
J. S. WILSON.

NOTES ON ANATOMY

*Monday finish - also - artio -
Tuesday artio
Wed - ~~artio~~ - ~~artio~~ -
Thurs - " - (B - us - Li)
Friday - artio - ~~artio~~ - ~~artio~~ -
m. m. - 82 -*

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- The Articulations -

The study of the joints or articulations is the study of the relations between bones, more particularly of the surfaces of apposition and the means by which the bones are held together in the skeleton and at the same time permitted motion one on another - In the study of osteology it has been seen that the surfaces of contact between the different bones present widely varying appearances, upon these differences depends the classification of the joints - In certain articulations the opposing surfaces present interlocking tooth-like processes, so that the union of the bones must result in a joint in which no motion can occur - Such a form of articulation is called synarthrosis -

Secondly the contributing surfaces to a joint may be roughened or manipulated, showing the attachment of ligamentous fibres which have passed directly between the opposing faces of the bones, or the attachment of the fibres may have been through the medium of plates of cartilage coating the surfaces: such a surface on a bone indicates that it entered into the formation of a joint at which motion must have been very slight, the result of bending or twisting of the interosseous ligamentous fibres; this form of articulation is known as amphiarthrosis - Lastly the bony surfaces forming a joint may be smooth and polished as a result of mutual friction - such surfaces are characteristic of a joint at which motion is free, and constitute a style of articulation called Diaarthrosis -

There are then three classes of joints; 1st Synar-

- Hyoid Bone.

The c. a. hyoid bone lies at base of tongue - Prob. speaking it is an appendage of temporal bone.

It divides into 1) body - now passing back from the body is grt. cornua and prop. from junction of grt. cornua with body is 2) lesser cornua & connects by means of a little joint with a capsular lig. same for grt. cornua

Body - (1) Ant. face - convex - rough - is divided by a long. ridge - the part of the bone above " (2) Post (3) Upper border } " " looks up. but below looks forward. - surface is rough & (4) lower " }

grt. cornua looks up - on each side of 1 ridge is a depression

Post face looks down & back. rough & marked by a line of depression.

Sup. border looks back & forward.
Post. " " down & forward.

Externity - presents a rounded art. surf. for

grt. cornua

Grt. cornua - is rounded rod of bone at its

Post extremity is enlarged. at its ant extremity

it presents an L - is rough for union with lig. across.

Less. cornua passes up back & inward & is less - but strong.

arthrodial, or immovable joints; 2^d the amphiarthrodial, or slightly movable joints; 3^d the Diarthrodial or movable joints.

Besides the bones there are other structures which contribute to the formation of the joints as follows.

In the amphiarthrodial and diarthrodial joints the bones are bound together by ligaments.

In the amphiarthrodial joints there are not only pass from bone to bone exterior to the joint but are also found in the joint passing directly between the opposing surfaces, these ligaments being called interosseous. In the diarthrodial joints as a rule no ligamentous fibres are attached to the articulating surfaces of the bones, but the ligaments more or less nearly surround the joint, attached to both bones beyond the articular surfaces; the ligamentous fibres may entirely surround the joint forming a capsular ligament, or they may be gathered into separate, scattered bundles.

In the diarthrodial joints the opposing surfaces of bone are coated by encrusting or articular cartilage, which presents a perfectly smooth free surface towards the joint and on its deep face is firmly attached to the articular lamella of the bone.

In order to render motion entirely easy and lessen friction the diarthrodial joints possess a secreting, serous-like membrane, called, the synovial membrane, which secretes a viscid, glairy liquid called synovia. The synovial membrane in very early life is said to be a closed sac, coating universally the interior of the joint, but soon the portion covering the encrusting cartilage is worn away, or

Classes of Synarthrodial joints -
Dentate or Serrate - Skull -
Suture by hamulus. Palate process (Sap)
Schendyles is a form of hemispherical
gomphosis - teeth

becomes inconspicuous -
In joints subject to very frequent motion the effect of friction is further guarded against by a plate of fibro-cartilage, called the inter-articular cartilage or meniscus: this is a more or less flat, generally circular plate of cartilage interposed between the encrusting cartilages of the bony surfaces and attached only by its circumference to the ligaments. When this exists entire the joint will have two synovial membranes; but occasionally the plate is worn through and then the two membranes communicating there is virtually but one.

- Symarthrodial Joints -

The immovable joints are almost confined to the articulations between the bones of the skull, which are generally spoken of as sutures.

There are several varieties of suture - 1st Dentate or Serrate, in which the edges of the bones present interlocking processes generally called dentate when the processes are long, toothlike and serrate when they are short and resemble the teeth of a saw.

2^d Suture by Harmony; in which two roughened surfaces come in contact, for example, the inner border of the palate processes of the two superior maxillary bones. 3^d Schindylesis suture, in which the edge of one bone is received into a groove in another, as between the corner and spheroid bone.

4^d Gomphosis, in which one bone is received into a corresponding cavity of another. This term is applied to the union between the teeth and their sockets, and is really no articulation.

Classes of Diarthrodial joints.

I Arthrodials.-

II Trochlear.

III Condylar.

IV Saddle shaped.

V Pivot.

VI Ball and Socket.

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The names of the individual articulations of the bones of the skull are derived from the names of the bones which form the suture, but in some instances the sutures have also names derived from other sources, as fronto-parietal, or coronal suture.

When a bone articulates with its fellow of the opposite side the name of the suture is formed by the prefix inter and the name of the bone, as inter-parietal suture.

- Diarthrodial Joints -

The diarthrodial joints, in accordance with the varying shape of the articular surfaces, are divisible into six varieties:-

1st Arthrodial, formed by more, or less flat plane surfaces, so that motion is much restricted.

2^d Hinge, or trochlear, or ginglymoid, which are characterized by the presence of a pulley or trochlea on one of the articulating surfaces. In this joint motion can occur, as a rule, only in two directions.

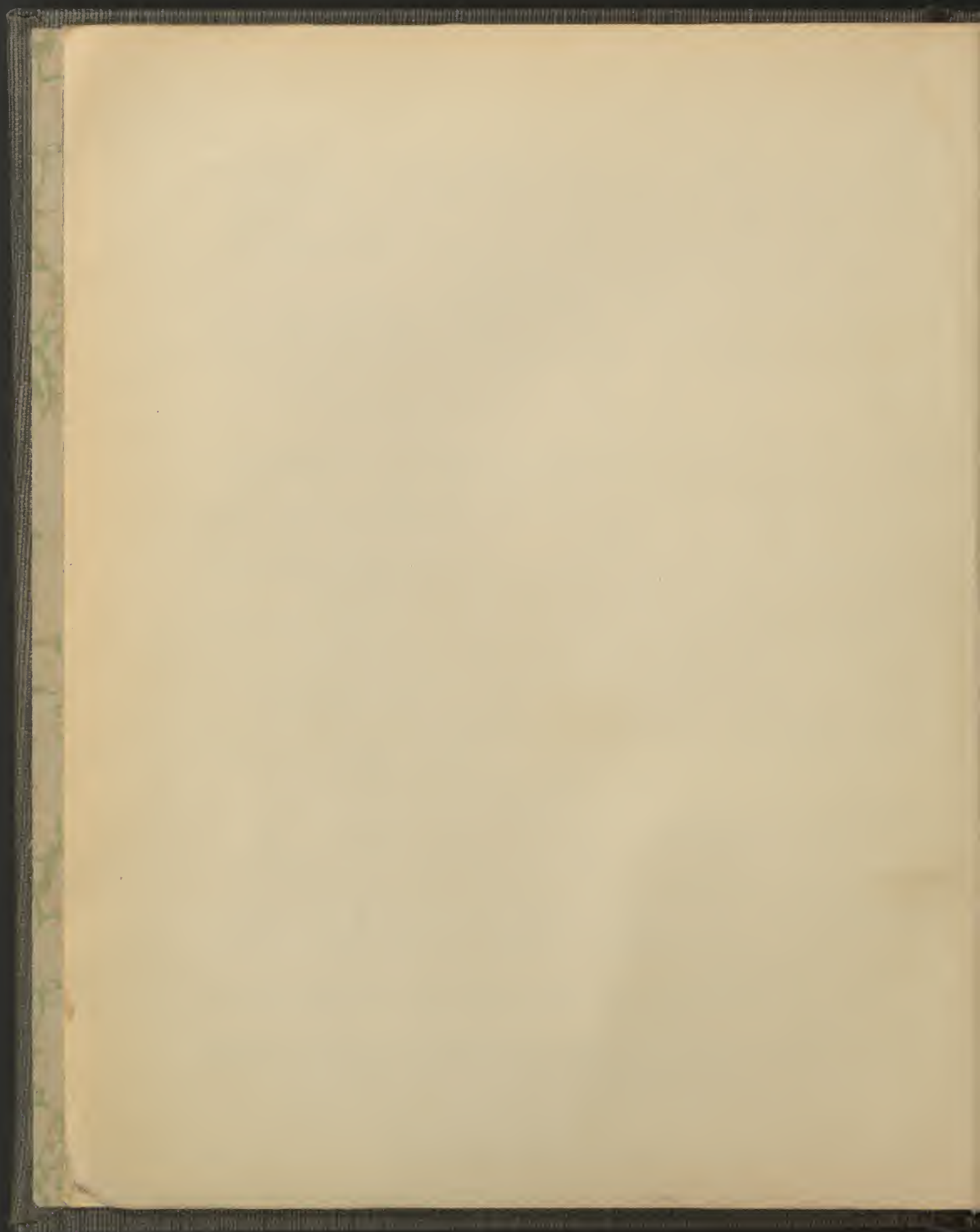
3^d Condylloid, in which one element is a condyle the other a proper receiving cavity. These joints are generally capable of very free motion.

4. Saddle shaped, or concavo-convex joints, or joints of reciprocal reception, where both surfaces are saddle-shaped and mutually interlock.

The examples of this form of joint are, sterno-clavicular, Temporo-maxillary, Trapezis-metacarpal and calcaneo-cuboid.

5th Pivot or Trochoid joints are only two, axoid and radio-ulnar.

They present an osseo-ligamentous ring, in which



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a part bone of one is received and in which, in the first example it acts as a pivot around which the other bone revolves and in the second rotates on its own axis.

6° Ball and socket, or enarthrodial joints present a more or less spherical head as one contribution while a receiving cavity is the other. The two important examples of this variety are the shoulder and hip-joints, in both of which motion is very free.

In describing a joint then, the following heads have to be considered.

1° The class and variety. - 2° The bony contributions. - 3° The ligaments. - 4° The synovial membrane. - 5° The intra-articular cartilage perhaps. - 6° The motions of which the joint is capable.

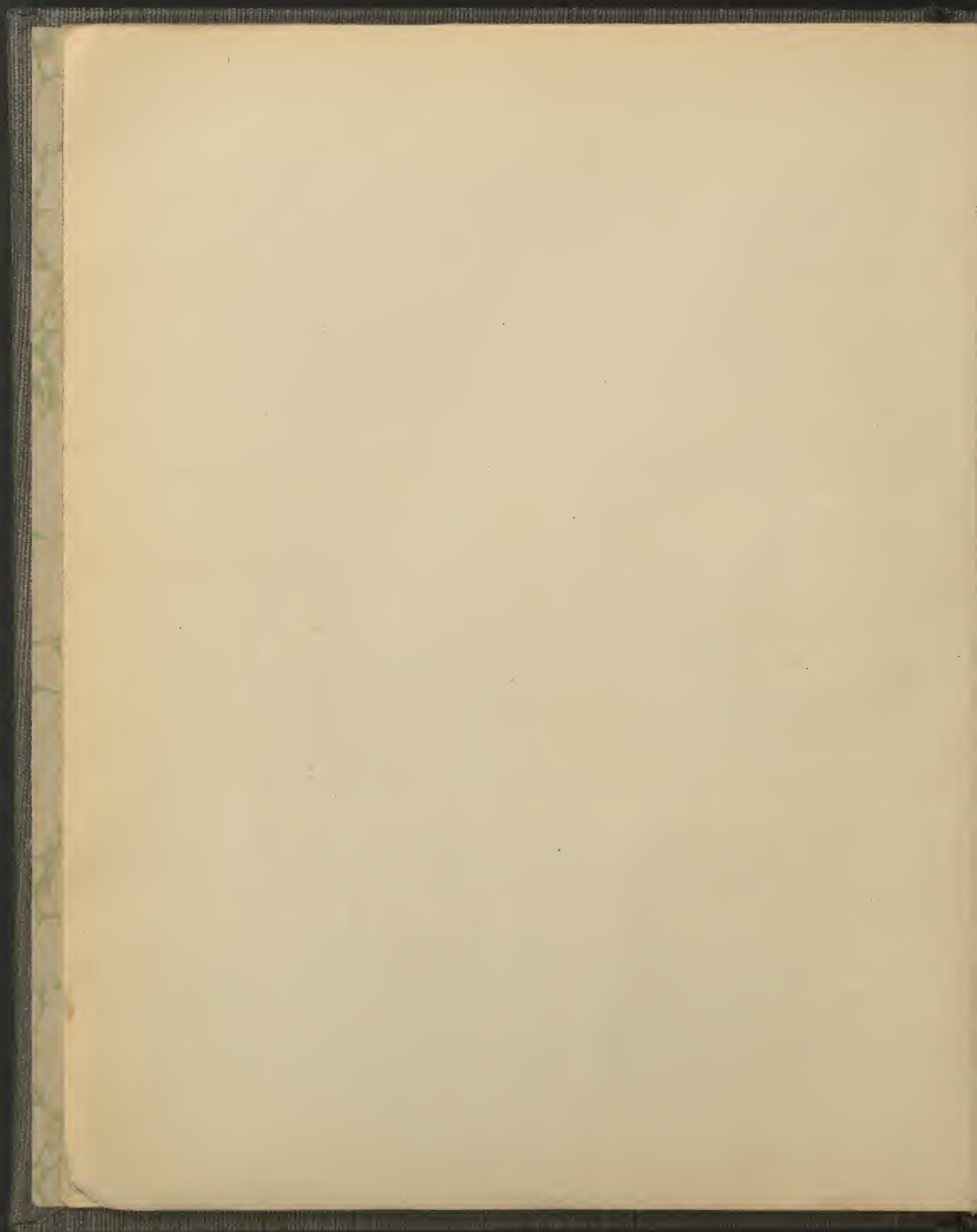
As numerous as the motions may seem to be they can all be referred to the following. (a) Gliding, which occurs to some extent in all diarthrodial joints, but which is peculiarly characteristic of the arthrodial, and which consists in a slipping of one more or less flat and plane surface on another.

(b) Flexion, which is angular movement of a segment of the body in an antero-posterior vertical plane, generally forward, but in a few instances backward.

(c) Extension, which is the reverse of flexion.

(d) Abduction, which is the movement of a segment away from some established mid-line, generally that of the body.

(e) Adduction, which is the reverse of abduction.



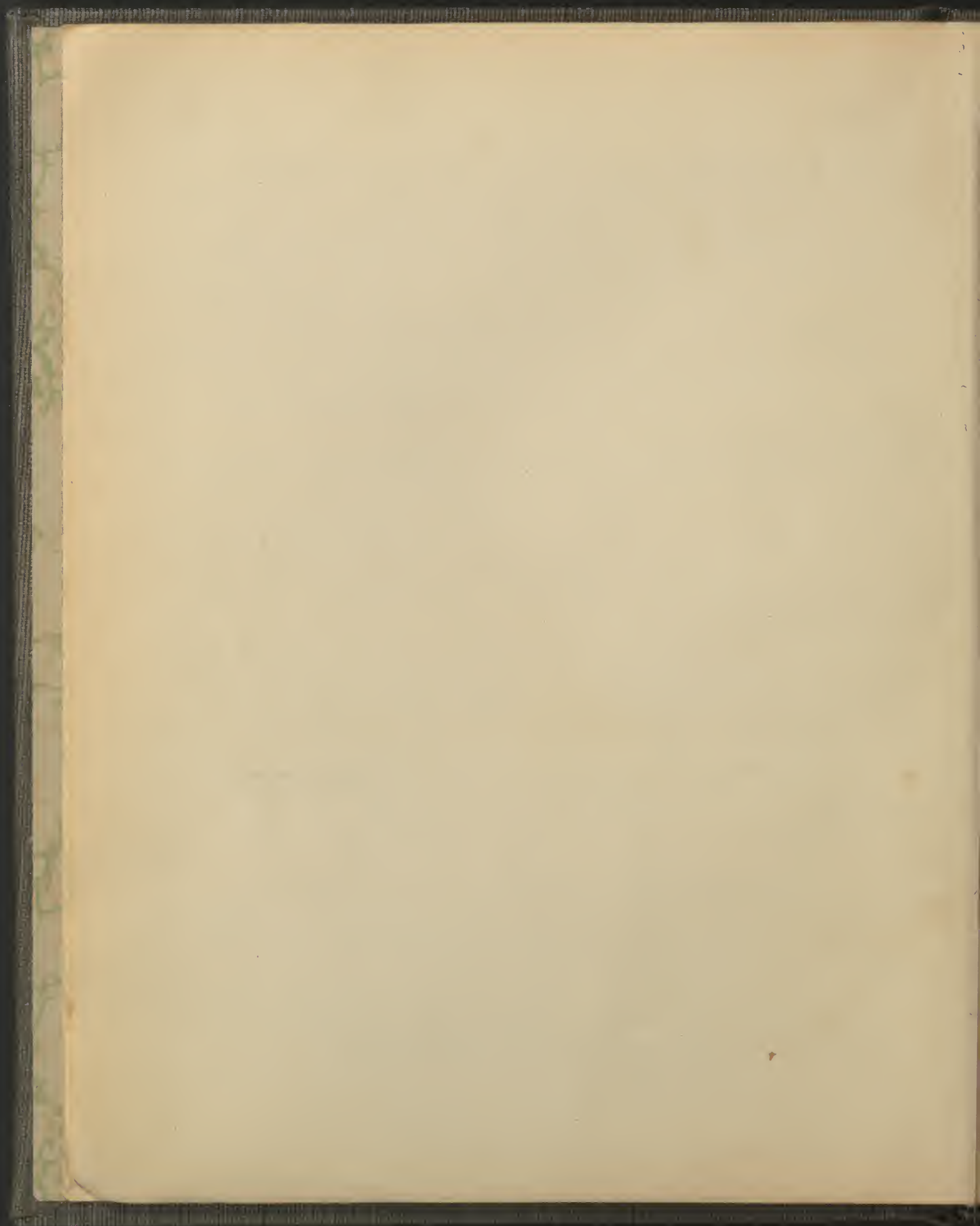
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(f) Circumduction, which consists in partial performance in rapid and regular succession of the four preceding movements, passing in inward circumduction from flexion to adduction, to extension, to abduction and again to flexion and in the reverse order in outward circumduction. In the performance of this movement the moving segment circumscribes a cone-shaped space, the apex being at the joint and the base being outlined by the distal end of the segment.

(g) Revolution, or false rotation; this occurs at only two joints, viz, atlas-axis, and radio-ulnar; in the former case the atlas revolves around the odontoid process as an axis; in the latter case, the radius rotates around its own axis in the ring formed by the orbicular ligament and the lesser sigmoid cavity.

(h) Rotation, or true rotation; this is almost limited to two joints, the shoulder and the hip, and as it happens can be defined in the same terms for both; being movement outward or inward around an imaginary line drawn from the innermost point of the head of the humerus or femur to the innermost point of the inner condyle of either bone.

6° A statement of the mechanism of motion, that is of the changes which occur in the relative position of the articulating surfaces during the performance of any given motion.

7° The muscles that are in contact with the ligaments of the joint and which may be considered as imparting strength to the articulation.



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8° The arteries and nerves distributed to the joint, in the case of the important articulations.

The Articulations of the Vertebral Column.

The Articulations of the spinal column may be divided into those of the

1° Column in general. 2° Atlo-axoid articulation.

3° Occipito-atloid articulation. 4° The sacro-vertebral articulation.

The Articulations of the Spine in general.

Each vertebra articulates with the vertebra above, and with one below by a diarthrodial and arthrodial joint on each side, formed by the superior and inferior articular processes. The ligaments of these joints are capsular around the articulating surfaces and those which bind the same segments of the different vertebrae together and which are generally called the common ligaments of the Spine.

— The Articulation of the Articular Processes.

The articulation between contiguous articular processes is a diarthrodial joint of the arthrodial variety presenting a synovial membrane and one ligament which is an imperfect capsular ligament.

— The Ligaments of the Spine in general.

1° The Ligaments of the Bodies.

The bodies of the vertebrae are connected by means of intervertebral disks, and anterior and posterior common ligaments. The intervertebral disk is found lying between the opposing surfaces of two adjacent bodies firmly adherent to each.

The ant. lig. widens as it descends
" Port " narrows " " " "

None between the axis & the atlas at a
bone.

in shape it corresponds exactly with that of the bodies between which it lies, and its thickness it varies in the different regions of the spine collectively the disks form about $\frac{1}{4}$ of the length of the column 4 excepting the peculiar vertebrae - 1st and 2^d between which there is no disk since the atlas has no body. The intervertebral disk or substance is formed externally of concentric laminae of fibrous tissue and fibro-cartilage the centre of the disk being a soft pulpy mass. The anterior common ligament is found descending along the front of the bodies of the vertebrae from the axis to the sacrum and widening as it descends. It consists of several superimposed layers of fibres, the deepest being the shortest and attached to adjacent bodies only the most superficial being the longest and extending over four or five bodies. The posterior common ligament is found within the spinal canal attached to the back of the bodies of the vertebrae from the axis to the sacrum. It consists like the anterior common ligament of several layers of fibres, but unlike it the ligament narrows as it descends and instead of having a straight edge has a scalloped one, widening on each intervertebral disk and narrowing over the bodies.

- The Ligaments of the Laminae.
Two adjacent laminae are held together by yellowish ligamentous fibres called Ligamenta subflava attached to the anterior surface of the lamina above and to the posterior surface of the lamina below; this being necessitated by the imbrication

Found only in the Dorsal & Lumbar Region

arrangement of the laminae-

- The Ligaments of the spinous Processes-
The spinous Processes are connected by two liga-
ments - supra-spinous and inter-spinous-

The supra-spinous ligament is a rounded cord,
extending from the spinous process of the 7th cer-
vical vertebra to the sacrum and attached suc-
cessively to the tips of the spinous processes; it is
continued upward to the occipital bone by the
ligamentum nuchae which takes its place in
the neck - which in the femur is simply a interspinous ligament.

The inter-spinous ligament is attached to the
adjacent edges of the spinous processes is unin-
terrupted and found only in the dorsal and lum-
bar regions-

- The Ligaments of the transverse Processes-
The transverse processes are held together only in
the lower dorsal and lumbar regions by thin scat-
tered fibres called intertransverse ligaments:
each ligament extending between the adjacent
transverse processes - are made by dissection (371.)

- The Atlo-axoid articulation-

The articulation between the atlas and axis con-
sists of a diarthrodial and arthrodioid joint on
each side, formed by the articular processes, as
between other vertebrae and of a pivot joint on
front between the posterior face of the anterior arch
of the atlas and the front of the odontoid process
of the axis - The ligaments of this articulation are
given in number.

- I Two ant. atts. avoid
- II Position " "
- III Transverse
- IV Capsular ligament -

- I Two ant. atts. avoid lig.
- II one Post. " " "
- III Transverse " "
- IV Capsular lig.

Transverse is attached laterally at.

1st Two anterior atlas-oid, one of which is a cord extending from the anterior tubercle of the atlas into the front of the base of the odontoid process; the other lying beneath is a membranous layer attached to the anterior arch of the atlas and base of odontoid process and body of the axis.

2^d Posterior atlas-oid, which is a membrane-like ligament attached above to the posterior arch of the atlas and below to the laminae of the axis.

3^d Transverse, which passing horizontally across the foramen in the atlas behind the odontoid process binds it to the anterior arch of the atlas, and as it passes over the odontoid process it sends a bundle of fibres downward to be attached to the base of the process and another upward to be attached to the basilar processes, thus assuming the shape of a cross, and hence often called the cruciform ligament.

4th Two capsular, which connect the articular processes.

The Occipito-atloid Articulation.

This is a movable joint of the condyloid variety; the articulating surfaces being the two condyles of the Occipital bone above and the two superior articulating surfaces of the atlas below.

The ligaments of this joint are (1^o) Three that pass between the atlas and occipital bone seven in number. (2^o) Three between the occipital bone and axis, four in number.

1st Anterior occipito-atloid, which consists of two parts a superficial rounded cord on the middle line extending from the basilar process to the anterior tubercle of the atlas and secondly a ligamentous membrane attached above to the anterior margin of the foramen magnum and below to the anterior arch of the atlas.

2^d Posterior occipito-atloid, which is also a broad membranous ligament passing between the posterior margin of the foramen magnum and posterior arch of the atlas.

Accipiter pallidus
I sent reports at Reg.
IV Post
IV The two species of
IV Two Transverse Reg.
IV Accipiter Pallidus Reg.
IV Accipiter Reg.

}} joints are class. first as to their curve. 11
to the movements.

3^d Two capsular ligaments, one on each side, each of which is attached above to the condyle and below around (the articulating surface of) the superior articular process of the atlas.

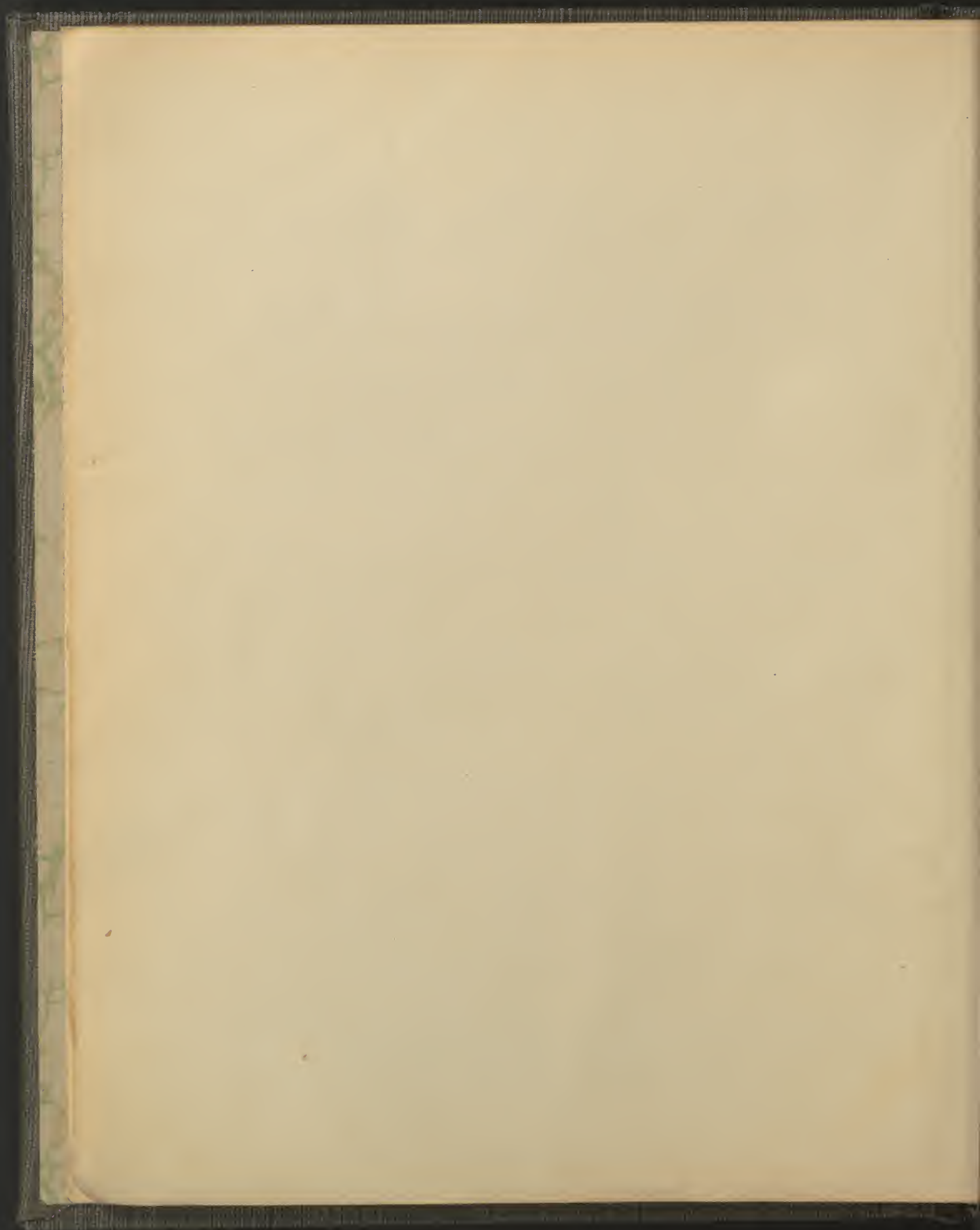
4th Two Lateral Occipito-atloid, one on each side, ^{is attached to the} extending from the transverse process of the atlas ^{to the transverse ridge (process) of the occipital bone.}

5th The occipito-atloid appears to be a continuation of the posterior common ligament of the spine, being attached to the posterior surface of the body of the axis it passes up covering over the odontoid process and cruciform ligament and is attached to the basilar process.

6th The odontoid ligament. consists of three parts which have a common attachment to the extremity of the odontoid process below, while above they separate one being attached to the front margin of the ^(the same side of opposite) foramen magnum and one to each lateral margin. These three parts are sometimes known as the check ligaments. middle one made by direction.

- Sacro-vertebral articulation -

The joint between the sacrum and last lumbar vertebra is similar to that between two vertebrae: the articulating surfaces being the articular processes of the two bones. The ligaments here are the same as at an intervertebral joint and in addition there are two ligaments on each side, the ilio-lumbar and lumbo-sacral, these being generally considered among the ligaments of the pelvis. The lumbar iliac ligament extends from the transverse process of the 5th lumbar vertebra out.



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ward to the ilium just above and in front of its ear-shaped articular surface. The lumbosacral ligament passes from the transverse process of the 5th lumbar vertebra downward and outward to the wing of the sacrum.

- The movements of the Spinal Column -
Motion at the intervertebral joints is very slight between any two vertebrae, but the aggregate is considerable. The movements are flexion, extension, right and left lateral motion, or right abduction, left abduction and adduction, rotation and circumduction.

Flexion, is the bending of the column forward.

The mechanism of this motion is that the superior articular processes glide upward and backward on the superior, the front of the intervertebral disks being compressed and the laminae and spinous processes separating.

Extension is the reverse of flexion.

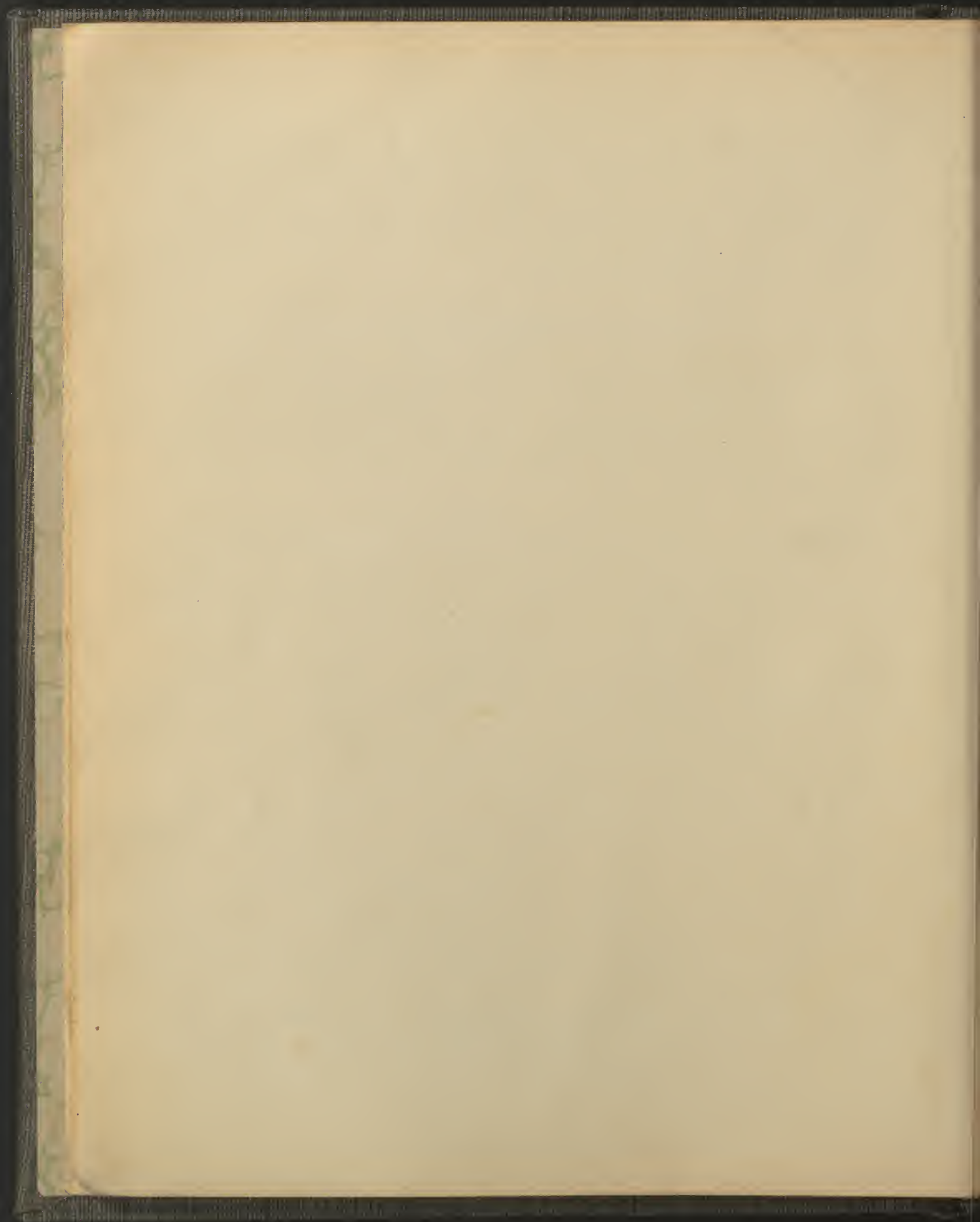
It is restricted by the anterior common ligament and by the spinous processes. Its mechanism is the exact reverse of that of flexion.

Lateral motion or abduction is a bending of the column to one or the other side; it is limited by the transverse processes and by the intervertebral disks.

During its performance the inferior articular process, on the side toward which motion occurs, glides downward and the opposite one upward.

Rotation consists in the movement of the column around its own axis.

It can occur, of course, to either side. The mechanism



ism of this movement is as follows, the inferior articular process on the side toward which motion occurs, moves backward, while the opposite one moves forward, the fibres of the intervertebral disk being twisted and stretched and the spinous process moving away from the side towards which motion occurs.

Circumduction is the partial performance, in succession of flexion, abduction, extension, adduction, so that the trunk and head circumscribe a cone shaped space, the apex of the cone being in the lumbar region, where the centre of motion is.

In the performance of these various movements the cervical portion of the column is free to move, the dorsal least so.

The atlas-axis joint participates in the foregoing movements, but possesses also the freedom of revolution, in which the atlas moves around the odontoid process as an axis carrying the skull with it. - In this movement, the inferior articular process of the atlas, on the side towards which motion occurs, glides backward and the opposite one forward on the superior articular process of the axis, while the anterior arch of the atlas moves on the front of the odontoid process. - This movement is restricted chiefly by the odontoid ligaments. Motion at the occipito-atloid articulation is confined to flexion and extension; on flexion the skull goes forward and downward and the condyles move upward and backward in their receiving cavities; the mechanism of extension the reverse.

Vertebral spinal ref to guy.

Shut. speaking this is not so.

Skellate m -

omit the summary of the osteology
of the ^{vertebral} column with the ^{vertebrae}
The Costo-vertebral Articulation.

The parts of the skeleton which enter into a costo-vertebral articulation are the posterior extremity of the rib and the body and transverse process of the vertebra with the intervertebral disk between ^{with} two vertebrae.

(The posterior extremity of the rib presents a head which is marked by a horizontal ridge, supporting the head is a neck which terminates about an inch from the head in the tubercle the extremity of which has an articular facet. The vertebral column furnishes a proper receiving pit for the head of the rib the lower lateral margin of each body in the dorsal region presenting a demi-facet and the upper lateral margin of the body below a similar one; the intervertebral disk between the two receiving the horizontal ridge on the head of the rib.

The extremity of the transverse process of each dorsal vertebra presents an articular facet for the one on the tubercle of the rib.)

This articulation is diarthrodial and arthrodial. The ligaments which connect the head of the rib to the vertebral column are Anterior-costo-vertebral, Capular and Inter-articular.

The anterior costo-vertebral ligament is attached to the anterior aspect of the head of the rib and radiating in three bundles, the upper is attached to the body of the vertebra above, the lower to the body of the vertebra below and the middle to the intervertebral disk between them. This ligament is known as the stellate owing to the divergence of its fibres.

No joint at junction of 1st rib and Sternum.
Reath is cont with sternum?

motion is very slight. gliding motion
in every direction
When head of rib is pulled up the ant
Ext^{er} tends to move down
these ^{are} named from the rib not reath.

15

The arrangement of this ligament differs from the foregoing description in the 1st, 11th & 12th ribs where the ligament of each is attached to the body of only one vertebra because the articular facet is furnished wholly by one.

The capsular ligament consists of a few scattered fibres around the articulation.

The interarticular ligament is attached to the horizontal crest on the head of the rib and to the intervertebral disk thus dividing the joint into two parts which are furnished with separate synovial sacs. (For the reason above given the 1st, 11th & 12th ribs have no interarticular ligament and but one synovial sac each.)

The articulation between the rib and transverse process, known as the costo-transverse, presents three ligaments, anterior, middle and posterior costo-transverse. The anterior costo-transverse ligament extends from the upper aspect of the neck of the rib to the transverse process above. The middle costo-transverse or interosseous ligament extends from the posterior surface of the head of the rib, directly backward to the transverse process. The posterior costo-transverse extends from the tubercle of the rib to the apex of the transverse process.

- Temporo-maxillary Articulation. -

The temporo-maxillary articulation is formed between the condyle of the lower jaw and the glenoid cavity of the temporal bone. (The condyle is oblong in shape & oblique in direction, its long diameter being from without inwards

1

in. Pterocle

Intra-articular fibro cartilage

Ligaments of the Temporo-Max joint

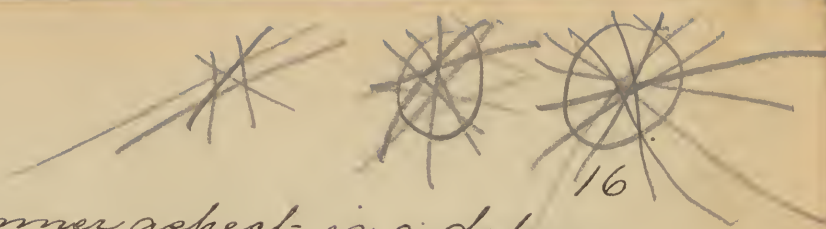
External lateral ligament

Internal " " "

Capular " " "

Stylo-Mandibular " " "

The intra-articular fibro cartilage has the L. & B. type.
collected in front 95 Gray



and backwards on its inner aspect is a depression for the external pterygoid muscle. The portion of the glenoid cavity concerned lies in front of the fissure of Glaser and presents in front of itself the eminentia articularis or the anterior root of the zygoma for the cavity lies between the two roots of the zygoma.

This is a diarthrodial and condyloid joint and presents four ligaments, internal & external lateral, capsular and stylo-masillary and an inter-articular fibro-cartilage which is sometimes perforated - when this is the case there is but one synovial sac in the joint, otherwise there are two one between the inter-articular cartilage and the other between it and the glenoid cavity.

The external lateral ligament is attached to the zygoma above, from its tubercle forward, and passing downward and backward is attached to the outer border of the neck of the condyle. *thinking of cop. fig.*

The internal lateral ligament is attached above to the extremity of the spinous process of the sphenoid bone and below to the shelf of bone forming the lower margin of the inferior dental foramen on the inner face of the ramus of the lower jaw. *growing*

The capsular ligament consists of thin scattered fibres around the joint.

The stylo-masillary ligament, properly is no ligament of this joint, it extends from the styloid process of the temporal bone to the angle and posterior border of the ramus of the lower jaw. *near in 508*

The movements of this articulation are four, de-

The cartons of the 203: rts have an inter alia label against each

depression, elevation, a lateral movement and a forward movement. In depression the lower jaw is separated from the upper the lower receding while the upper is almost stationary. The mechanism of movement consists in a rolling forward of the condyle on the eminentia articularis and when exaggerated may lead to dislocation.

Elevation is the reverse of depression. In the lateral movement the lower jaw is twisted to one side, as in grinding between the molar teeth; this movement is checked by the condyle of the side towards which motion occurs, coming in contact with the inner limit of the glenoid cavity.

- The Costo-sternal Articulation -

The ribs have attached to their anterior extremities the costal cartilages which prolong the seven true ribs to the side of the sternum where the cartilages are received into pits found there being held in place by ligamentous fibres which pass from the cartilage to the sternum in front and behind. The cartilages of the 2^d, 3^d ribs have also an interarticular ligament each.

- The Articulations of the Pelvis -

The articulations of the pelvis are four, that between the 5th lumbar vertebra and pelvis, that between the sacrum and coccyx, that between the sacrum and os innominatum of each side and that between the two ossa innominata.

Sacred Texts
in the Library of the
University of Chicago
Chicago
Sacred Texts

The ligaments which hold the 5th lumbar vertebra to the sacrum have been described with those of the spine. The coccyx is held to the sacrum by a small intervening disk and by ligamentous fibres in front and behind.

The os innominatum is held to the sacrum by an articulation between the sacrum and ilium and by two other ligaments known as greater and lesser sciatic. The sacro-iliac articulation, or symphysis or symchondrosis is effected by the auricular surfaces of the sacrum and ilium and two ligaments, anterior and posterior sacro-iliac.

The anterior sacro-iliac ligament consists of a thin plane of fibres passing between the front of the sacrum and ilium.

The posterior sacro-iliac ligament is a large strong mass of ligamentous fibres which pass from the rough surface behind the auricular surface of the ilium to the similar one of the sacrum filling the deep depression which would otherwise exist there.

The two sacro-sciatic ligaments have a common attachment to the edges of the coccyx and sacrum and posterior inferior spinous process of the ilium as the mass passes forward and outward, one part the lesser sciatic ligament is attached to the spine of the ischium, while the rest continues on as the greater sciatic to be attached to the tuberosity of the ischium and along its ramus.

The aperture above the lesser sciatic ligament is

9 plates of folio cartilage.



9 plates of folio cartilage.
Halter in front than behind -
and a normal Sack.

Triangular lig. of the suber.
Base back. corresp. to a line drawn
between the inter. ischial points.
Sides are attached to the post
edge of the int. border of the
series of the 1. and 2. and 3.
are the
apex forward, seen with a magnifying
in it is the subcutaneous structure.

known as the greater sacro-sciatic foramen and the one between the two ligaments as the lesser sacro-sciatic foramen.

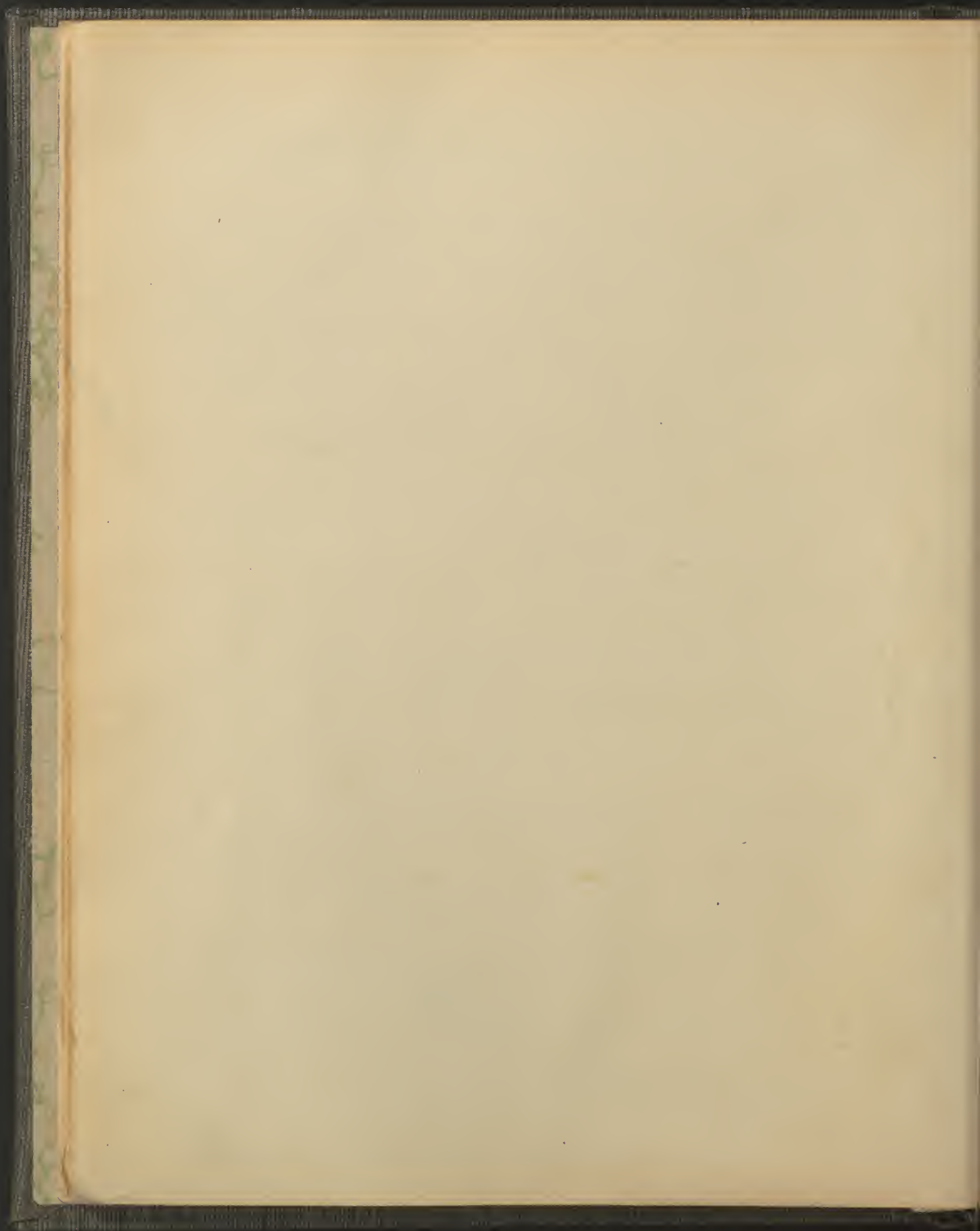
The Articulation between the two ossa innominata is found between the two pubic bones on the front of the pelvis and is known as the symphysis pubis.

Each bone presents an oval articular surface, whose long diameter is downward and backward, coated by a thin plate of encrusting cartilage, these plates being in contact only at the back part leaving a wedge-shaped interspace in front which is filled by fibres passing between the two plates. Besides this interarticular ligament there are four others, superior, which consists of fibres passing between the two bones above the articulation, anterior, consisting of fibres passing across in front, posterior, consisting of fibres passing across behind and inferior which is formed by fibres stretching between the bones below and filling in the angular interval between the two arms so as to form a smoothly curved arch.

- The Sterno-clavicular Articulation

The sterno-clavicular is a movable joint of the saddle-shaped variety and is formed by the upper end of the sternum, cartilage of the first rib and inner extremity of the clavicle.

(The upper end of the sternum furnishes an articular depression on its lateral aspect facing upward and outward its long diameter from above downward and separated from the articu-



lar depression of the opposite side by the semilunar notch in the top of the sternum.)

The cartilage of the first rib by its upper border aids the depression on the sternum in furnishing a receiving cavity for the inner extremity of the clavicle.

The inner extremity of the clavicle presents an articular surface, oblong and with its long diameter vertical and which is continued on the lower aspect a short distance.

The ligaments of this joint are three a capsular, the costo-clavicular and interclavicular; the capsular, attached to the margins of the articular surfaces on the clavicle, sternum and cartilage of the first rib, is sometimes divided into two, anterior and posterior sternoclavicular continuous with one another above and below. The costo-clavicular ligament is attached to the under surface of the clavicle and passing downward and inward seizes the upper border of the cartilage of the first rib.

The inter-clavicular ligament seizes the inner extremity of one clavicle on its upper aspect where it is continuous with the capsular ligament and passing across the top of the sternum, sinking into the semilunar notch, is fixed to the opposite clavicle in the same manner.

This joint is provided with an inter-articular fibro-cartilage which is attached above to the upper part of the articular surface of the clavicle and below to the sternum and cartilage of the first rib just where they meet; thus it can act as a ligament in holding the parts in apposition; it is often

2

The outer system of elev. rests on the
acromioclavicular process.

Inner arch for Cath.

much worn, in a laboring man especially; the degree of attrition being greater on the right side owing to the more frequent action of that side.

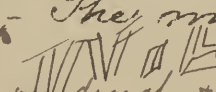
The joint of course presents two synovial sacs. The movements are slight but in every direction upward, downward, backward and forward.

The inner end of the clav. moves in opposite direct to outer extrem. but it is acting as a pivot.

- Scapulo-clavicular Articulation -

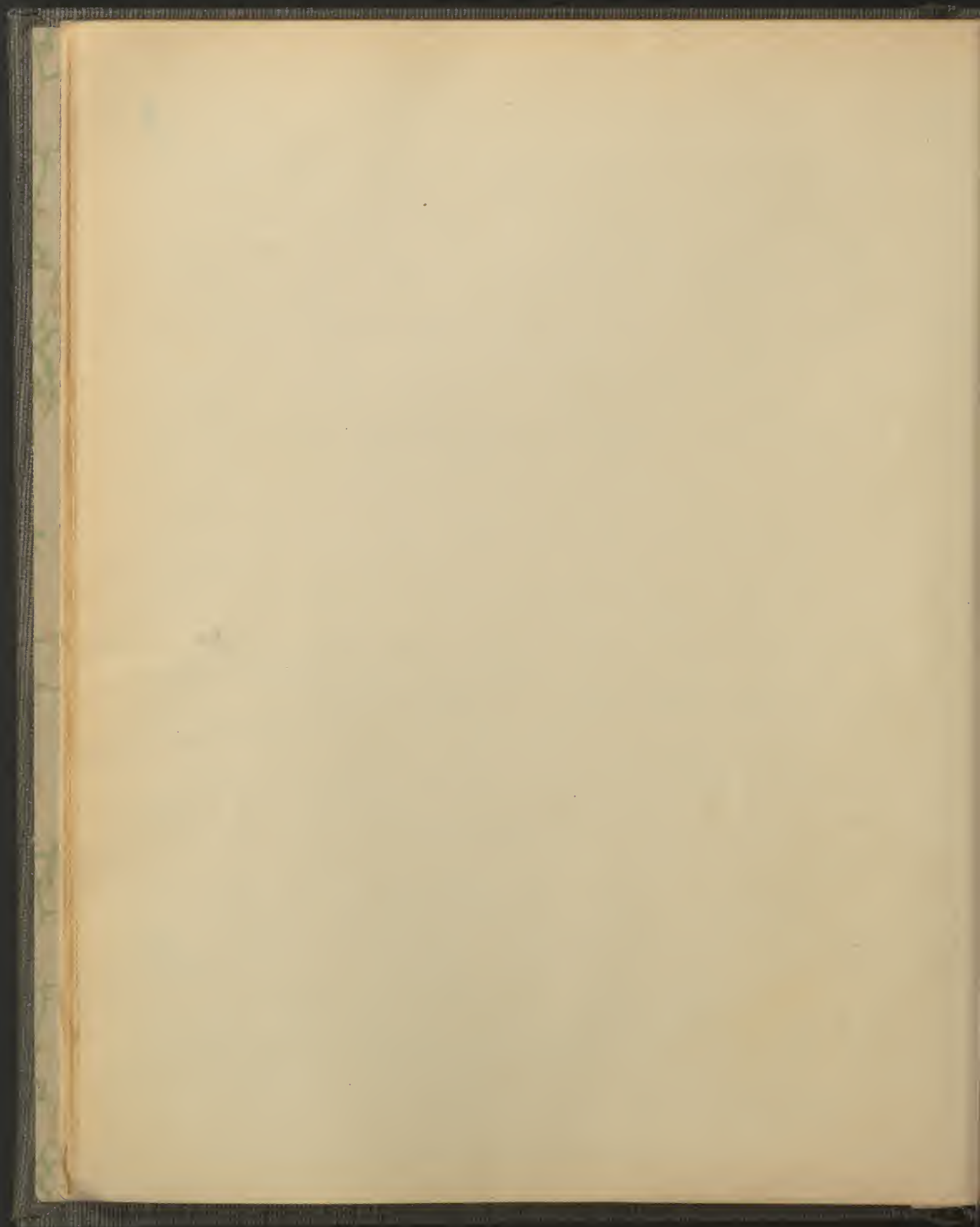
The scapulo-clavicular is a movable joint of the arthrodial variety, the articulating surfaces being an oval facet on the outer extremity of the clavicle and a corresponding facet on the anterior edge of the acromion process of the scapula near its apex; it should also be observed that the clavicle in its outward course passes just above the coracoid process but does not articulate with it (though receiving a ligamentous attachment to it.)

The ligaments of this joint are two, capsular and coraco-clavicular. The capsular is attached around the articulating surfaces. The coraco-clavicular passes up from the coracoid process to the under surface of the clavicle; when viewed from the front this ligament presents a quadrilateral outline and is called trapezoid, from behind a triangular outline and is called coroid.

The joint is provided with an inter-articular fibro-cartilage, often absent. or frequently The movements are slight but varied simply  gliding in all direct. + also rotation.

- The Ligaments of the Scapula -

Stretched between different points on the scapula are two ligaments, coraco-acromial and transverse.



22

The coraco-acromial, thick and triangular is attached by its apex to the tip of the acromion and by its base to the coracoid process; serving as a protecting arch over the shoulder joint. The transverse ligament of the scapula process over the supra-scapular notch from one extremity of it to the other thus converting it into a foramen.

- The Shoulder Joint.

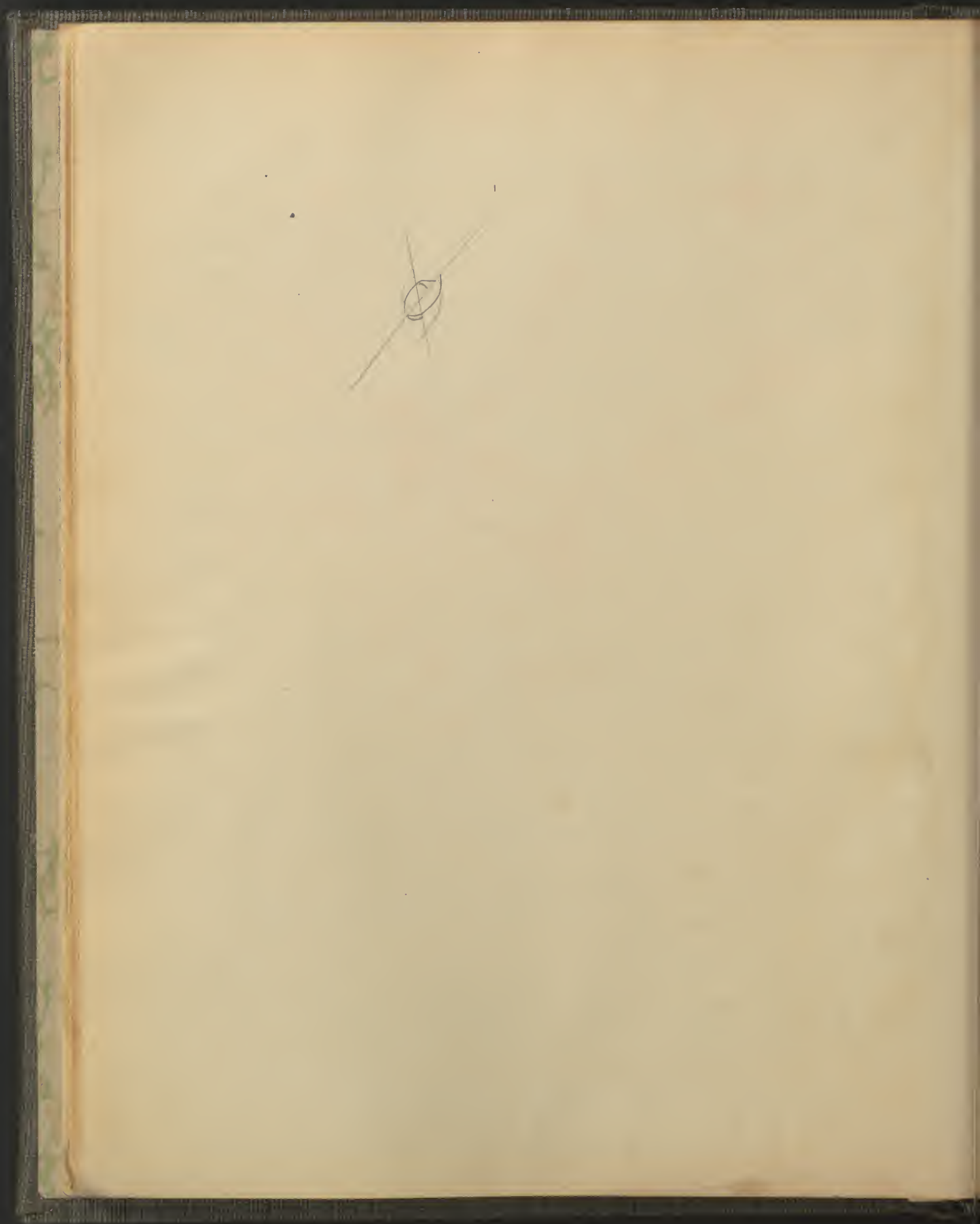
The shoulder joint or scapulo-humeral articulation, belongs to the movable class and ball and socket variety.

(The bony surfaces contributed to this joint are the upper extremity of the humerus and the glenoid cavity of the scapula.)

The points to be noted on the humerus are, the globular articular head supported by the anatomical neck, the greater and lesser tuberosities, separated in front by the bicipital groove.

The glenoid cavity is situated at the anterior angle of the scapula is articular for reception of the head of the humerus, shallow oval, its small end up and its long diameter vertical; the cavity is surrounded and slightly deepened by the glenoid ligament which is a fibro-cartilaginous band, triangular on cross section, attached to circumference of the cavity; partially continuous with the upper part of the glenoid ligament is the tendon of the biceps muscle.)

Holding the bones connected is a capsular ligament attached above to the scapula just behind the glenoid ligament and below to the anatomical



neck of the humerus, being prolonged thence over the tuberosities. *Extensor Lig.*

The upper part of the capsular ligament is thickened and often individualized into a separate ligament under the name of coraco-humeral, extending from the base of the coracoid process to the greater tuberosity of the humerus. The capsular ligament is remarkably long and loose surrounding the head of the humerus but loosely and by its redundant length allowing separation of the humerus from the scapula to the extent of an inch; these characters of the capsular ligament endow the shoulder with peculiar freedom of motion. The synovial membrane of this articulation often communicates with a bursa mucosa beneath the tendon of the subscapularis muscle and sometimes with one beneath the infra-spinatus.

Strengthening the various aspects of this joint are the following muscles.

Above, the supra-spinatus.

Behind, the infra-spinatus and teres minor. *INB*

In front, the subscapularis.

Forming a protecting cushion over the joint in front, behind, and above is the deltoid muscle, which covers the insertion of the other muscles and produces the bulge of the shoulder.

Besides these muscles the joint is further provided against the effect of violence incident from above by the overhanging arch formed by the acromion and coracoid processes and the coraco-acromial ligament stretched between them.

The movements at the joint are, flexion, extension.

Human Skin

2nd at 7 Adm. me.---

R.

... ..

... .. of fascia of 2 layers

2 -

Ext. oblique -

an in { super. an of Epig. the ant. its vein.
sup. { wing sup. sig - gen h.w. =
vein { also subcutis ext. part.
Hypo gastric branch of
inguinal branch of

Deep. layer ^{Sup. fascia?} is adherent around the ext. atom ring.
also run into down is called into
The can be
... .. of the is
... .. layer is adherent to
... .. later as
... .. on getting into
... .. get. mus. fibres and from the
... .. it also
... ..

Ext. Abdom. mus. its appen is thin &
... .. ant sup.
... .. and is
... .. is
... ..
... ..
... ..
... ..
... ..

in, abduction, adduction, circumduction and rotation. The mechanism of these movements is as follows. In flexion the humerus is carried forward and the head simply spins on its axis in the glenoid cavity.

In extension the reverse occurs, the head of the humerus of course spinning in the opposite direction and the humerus is moved backward.

In abduction the humerus is carried outward from the middle line of the body and its head moves downward in the glenoid cavity; pressing against the lower part of the capsular ligament and were the motion exaggerated rupture of the ligament might occur and consequent dislocation of the humerus.

Adduction is the reverse of abduction.

Circumduction is the combination of the preceding motions the head of the humerus rolling around the glenoid cavity.

In rotation the humerus revolves around an imaginary axis represented by a line drawn from the centre of the head to the internal condyle, the head moving backward in inward rotation and forward in outward rotation.

- Radio-ulnar Articulation -

The articulation between the two bones of the forearm forms a movable joint of the trochoid, or pivot variety. The bones articulate both at their upper and lower extremities being separated by the interosseous space throughout their shafts.

The upper extremity of the ulna presents the rep-

(on inner surface, is transverse fucoid) - surface is a smooth
 with the same to subventral lig. exactly same of super.
 a primary arch of " " " up: 4 lig. just behind
sub-st. lig. -

There is a slit in approx of Ext oblique. lower inner st. corresp. to
 the crest of subo. Δ crest of split = down ward & forward.
 are down & in. int. to spine of pith.

Edges of ring are yellow. of ring - sup & inf

The int. collar matches with filler of opposite side.

The right " " being superficial

The ext. n. inner. is but in parts lig.

To prevent the splitting of ring up too far you have outer
 Collum fibers. running across the upper & outer border of
 ring.

The int oblique & trans. mus. are both inserted into outer 1/2
 of pith lig. are blended together int oblique goes a little
 further down on soup. lig. are fleshy in region. & as they
 move the lig. int. from the can. arch rising 1/2 in
 some pith lig. as long as they run. fleshy = arch
 when they become tendinous - conjoin tendon
 and is inserted behind ext abdon ring into post. line
 and crest of super.

where the can. arch ceases to arise = outer attachment
 " " " tendon can. to insert = inner " " "



If you cut just below can. arch & above
 pith lig. you cut into abdon cavity
 2-3 mm.

The hairs force pierce below can. arch. and in
 it is a hole just beneath ext. pith. line on can.
 arch is the sup. abdon ring. length 1/2

ward projection of the olecranon process, tipped by its beak, and the forward projection of the coronoid process; occupying the front of the humerus and the upper aspect of the latter is the articular surface, called the greater sigmoid cavity, marked along its centre vertically by a ridge, in order to correlate it to the trochlea of the humerus on which it plays. Encroaching on the outer side of the greater sigmoid cavity is the concave articular surface known as the lesser sigmoid cavity, which receives the head of the radius.

The upper extremity of the radius presents its head surmounted by a cup-like articular surface receiving the eminentia capitis of the humerus; the rim of the head being articular to play in the lesser sigmoid cavity & supporting the head is a neck and below the neck internally is the bicipital tuberosity.

The lower extremity of the ulna consists of two parts, the styloid process and the capitulum ulnae.

The styloid process projects downward from the inner back part and is separated at its base, behind by a vertical groove, on the summit of the lower extremity by a rough pit. The capitulum ulnae is articular on its summit for the triangular cartilage of the wrist joint and on the outer part of its circumference for the sigmoid cavity of the radius. The lower extremity of the radius is quadrilateral.

Projecting downward from the outer side is the styloid process, which is grooved posteriorly, connects

see the Co-mate Cord. which runs down & in
the 2. = inguinal canal. from deep to super-
ficial chain rings. duct down & in.

roundus above corp. arch.

Below Dupanto lig.

Ant. approx. ext oblique.

(Post. - inner 1/2 = corp. tendon -

outer 1/2 = trans fascia.

Inner surf of abdomen mus. is well.

Just below the outer attachment of corp. arch is int. abdomen ring.

Deep. Epigastric - city. int. to ^{int.} ring.

The testicle is enveloped by Infundib. fascia. base = down
the inner mus up and to int. ring and is
attached to margin of ^{sup.} ring to superficial fascia
face of trans fascia. = visceral cavity for testicle.

Cumastu mus. on ext surface of Infund. tube. are
attached to susp. lig passing through int. abdomen
ring. the other fibres are attached to Corp. tendon
- int. Dupanto.

1. Skin
2. Trans fascia
3. Cumastu mus
4. Infundib.

Canica for testis extends only into lower pt of wall
of Infundib. -

Ant. abdomen ring - partial layer of peritoneum over
it being passing a little deeper. you see
as a ridge by Epigastric artery. but not

and sub-cutaneous externally and articular internally. The summit of the lower extremity is articular for the first row of carpal bones; this surface is crossed antero-posteriorly by two slight ridges, is continuous with the articular surface on the inner side of the styloid process, is concave and is called the carpal cavity. The inner side of the lower extremity presents a shallow, articular concavity, the sigmoid cavity of the radius, whose long diameter is antero-posterior, and which is separated from the carpal cavity by a narrow rough margin, to which the base of the triangular cartilage is attached.

The front of the lower extremity is protuberant and rounded; the back is rough and vertically grooved. The ligaments holding the bones together are found at their upper and lower extremities and between their shafts. Above the two bones are held together by one ligament, the orbicular, which forms three fourths of a ring, the other fourth being the lesser sigmoid cavity of the ulna. The ligament surrounds the articular rim of the head of the radius and is attached by its two ends to the extremities of the lesser sigmoid cavity.


The lower fibres of this ligament are tightly stretched around the radius just below the bulge of its rim and hence it is difficult to release the radius from its grasp.

The shafts of the two bones are connected by two ligaments, the oblique and interosseous.

The oblique ligament is a narrow band that passes downward and outward from the ulna, at the base of the coronoid process, to the radius,

inner surface. when with on inside of
 body ex. conical - " "

Ext. abdomen ring of a single or double row
 of cells. & entering int. ring for a
 few cells.

 H-Reticularis
 Epigastric cell

1st ridge. made by by the gastric cells into
 internal conical for a.
 can cross.

Descent of notula.

humeri. of Gut.
 1. Prothorax - covering the mouth of Inferior tube.
 complete when it emerges through sup. abdomen ring.
 and dist.

- (1) Prothorax
- (2) humeri
- (3) Curvatura fasciis
- (4) Inter cell fasciis
- (5) Sup layer of sup fasciis

Conjugal. humeri. - by non atrophy of the lateral
 sac -

Partial atrophy - nearly to deep ring. on gut runs
 during along the side of the sac or curvatura the
 sac.

Prothorax of Gut
humeri - humeri of abdomen arm

also curvatura
 humeri.

- (1) Prothorax
- (2) Curvatura fasciis
- (3) Conj. humeri
- (4) Inter cell fasciis
- (5) Sup layer of sup fasciis
- (6) L. cell

just below the tuberosity.

The interosseous membrane extends from the lower extremities upward about two thirds the length of the shafts, leaving an interval above, which is crossed by the oblique ligament.

The fibres of the interosseous membrane are directed downward and inward between the inner border of the radius and the outer border of the ulna.

The membrane is pierced by a foramen for the anterior interosseous artery about the lower third of the fore-arm.

The two bones are held together at their lower extremities by two ligaments and the triangular fibrocartilage of the wrist.

The two ligaments are one in front and the other behind passing across the joint and attached to corresponding faces of the bones.

The triangular cartilage tips the summit of the capitulum ulnae and excludes it from the wrist-joint. It is attached by its apex to the pit between the styloid process of the ulna and the capitulum ulnae; by its base to the narrow rough margin between the sigmoid and carpal cavities of the radius.

The movements between the two bones are two, in both of which the radius alone moves.

The radius can move forward, pronation, or backward, supination; in both the hand is carried along.

In these movements of rotation, or revolution, the radius rotates around an axis represented by an imaginary line drawn from the centre of the head of the radius through the centre of the capitulum ulnae.

2 " 2 you may have splitting of compound bottom
3 " " " " slipping across " " " " outside side
~~rather than water canals~~

consequently in performing pronation the sigmoid cavity of the radius moves forward on the articular rim of the capitulum ulnae, in supination the reverse occurs; while the head of the radius rotates in the orbicular ligament and lesser sigmoid cavity of the ulna. ✓

- The Elbow Joint.

The elbow joint is of the movable class and hinge variety; its bony surfaces being furnished by the lower extremities of the humerus on the one hand and on the other by the upper extremities of the ulna and radius; the latter have been described with the radio-ulnar articulation.

The lower extremity of the humerus presents on its lateral aspects the condyles, internal and external.

On its very extremity the humerus carries an articular surface divided into two parts; the outer is the rounded articular protuberance, eminentia capitata, intended for articulation with the cup surmounting the radius, the inner one, separated from the eminentia capitata by a depression, is a trochlea, which consists of two prominences with an intervening depression; above the trochlea in front is the coronoid fossa, above it behind is the more capacious olecranon fossa.

As this is a ginglymoid joint it has no capsular ligament but the bones are held in apposition by ligaments, placed in front, behind and at the sides of the joint and the radius is confined in the lesser sigmoid, which forms about the fourth of

13. The ant is almost below the ^{ulna.} ~~ulna~~ & ulna lig.
" " " " " " ulna groove in leg.

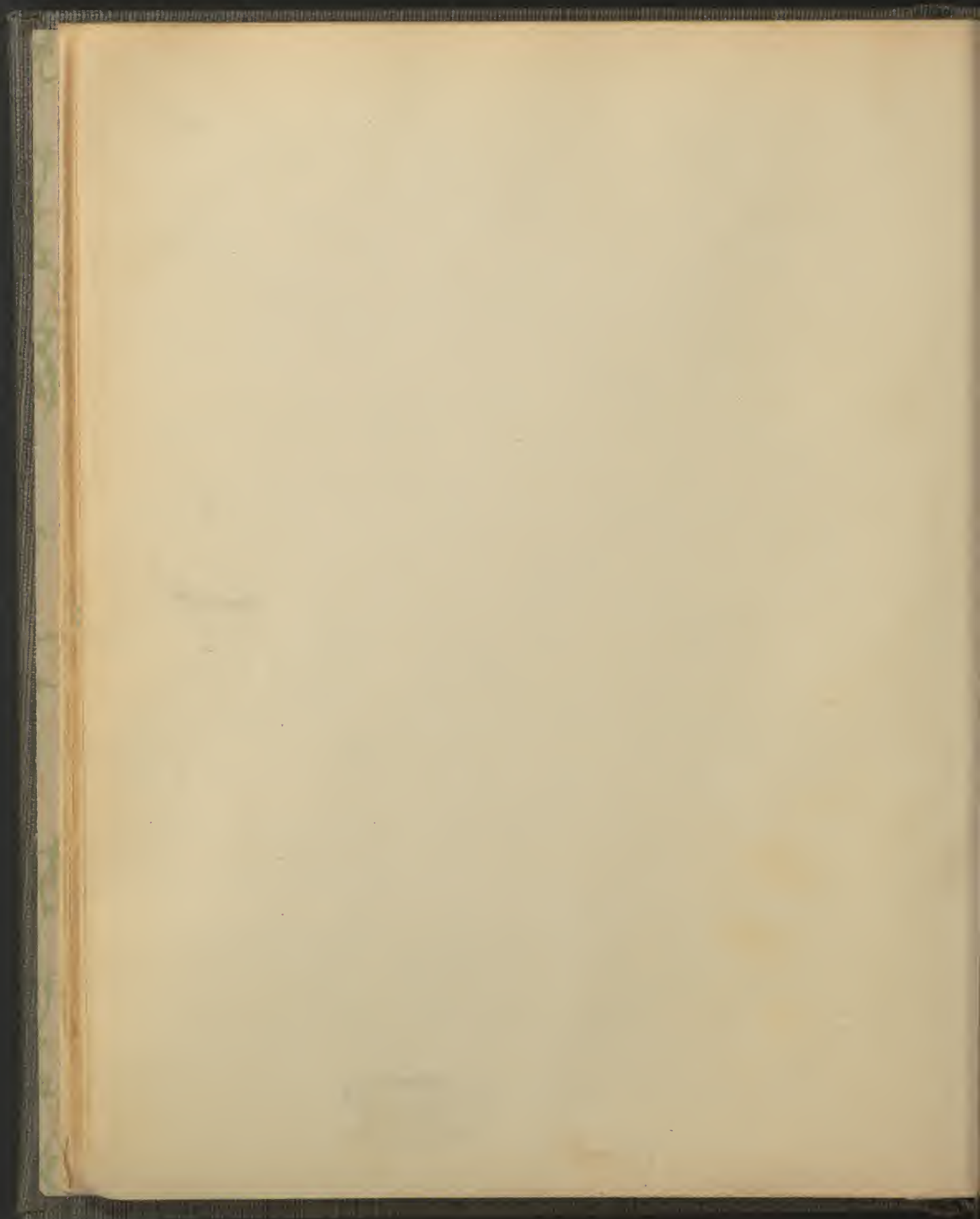
the periphery of a circle, by a ligament called the orbicular which is an incomplete ring attached by its ends to the extremities of the lesser sigmoid cavity, thus completing the circle in which revolves the head of the radius and as the orbicular ligament is drawn most tightly just beneath the articular rim of the head of the radius the latter cannot be pulled out of the grasp of the ligament without rupturing it.

Since revolution of the radius in the orbicular ligament and lesser sigmoid cavity is demanded by full power of movement in the hand and since this revolution would be impossible were it seized by any ligament attached to the humerus, for ligamentous fibres are inelastic, it will be found that certain ligaments of the elbow joint in order to avoid this interference with revolution of the radius are attached to the orbicular ligament and some of them seize the radius. The ligaments which bind the humerus to the bones of the fore-arm are anterior, posterior and two lateral. The anterior ligament is attached above to the humerus just above the ~~coronoid~~ ^{coronoid} fossa and below to the coronoid process and orbicular ligament.

The posterior ligament is thin and weak, attached to the humerus just above the olecranonid fossa it descends to seize the olecranon, the groove just behind the greater sigmoid cavity.

The external lateral descends from the external condyle of the humerus to the orbicular ligament.

The internal lateral ligament, triangular in shape, is attached by its apex to the internal con-



dyle of the humerus and descending divides into two fasciculi one of which is attached to the inner edge of the greater sigmoid cavity on the olecranon and the other to the inner edge of the greater sigmoid cavity on the coronoid process.

The muscles which strengthen this articulation are as follow.

On the front are the brachialis anticus.

Behind are the anconaeus and triceps.

Internally are the muscles of the front of the forearm which spring from the common origin.

Externally are the muscles which arise from the external condyle of the humerus; notably the spirator brevis.

The movements are the two characteristic of a hinge joint, flexion and extension.

The mechanism of flexion is that the greater sigmoid cavity and articular cup of the head of the radius move forward on the articular surface of the lower extremity of the humerus, the former on the pulley and the latter on the eminentia capitata.

This movement is checked when the apex of the coronoid process impinges on the bottom of the coronoid fossa. The mechanism of extension is the exact reverse of that of flexion and is limited by contact of the beak of the olecranon process with the bottom of the olecranon fossa.

- The Wrist-Joint. Nov. 13th 1881

The wrist joint belongs to the movable class and the condyloid variety; the condyle being furnished by the upper row of carpal bones, scaphoid, semilunar.





note by. is not attracted to the
ulna behind.

95/ note the opposite of the Reg. of the ulna

nar and cuneiform, having its long diameter transverse, the receiving cavity for the condyle is contributed by the lower end of the radius and a plate of fibro cartilage which lies on the bottom of the ulna.

This plate of fibro-cartilage is triangular in shape and is attached by its apex to the outer aspect of the base of the styloid process of the ulna while its base is adherent to the inner edge of the articular surface of the radius thus cutting the ulna off from direct participation in the joint.

The ligaments of this joint are four, anterior, posterior and two lateral. The anterior ligament is attached, above to the front of the radius and ulna and below, to the front of the bones of the condyle.

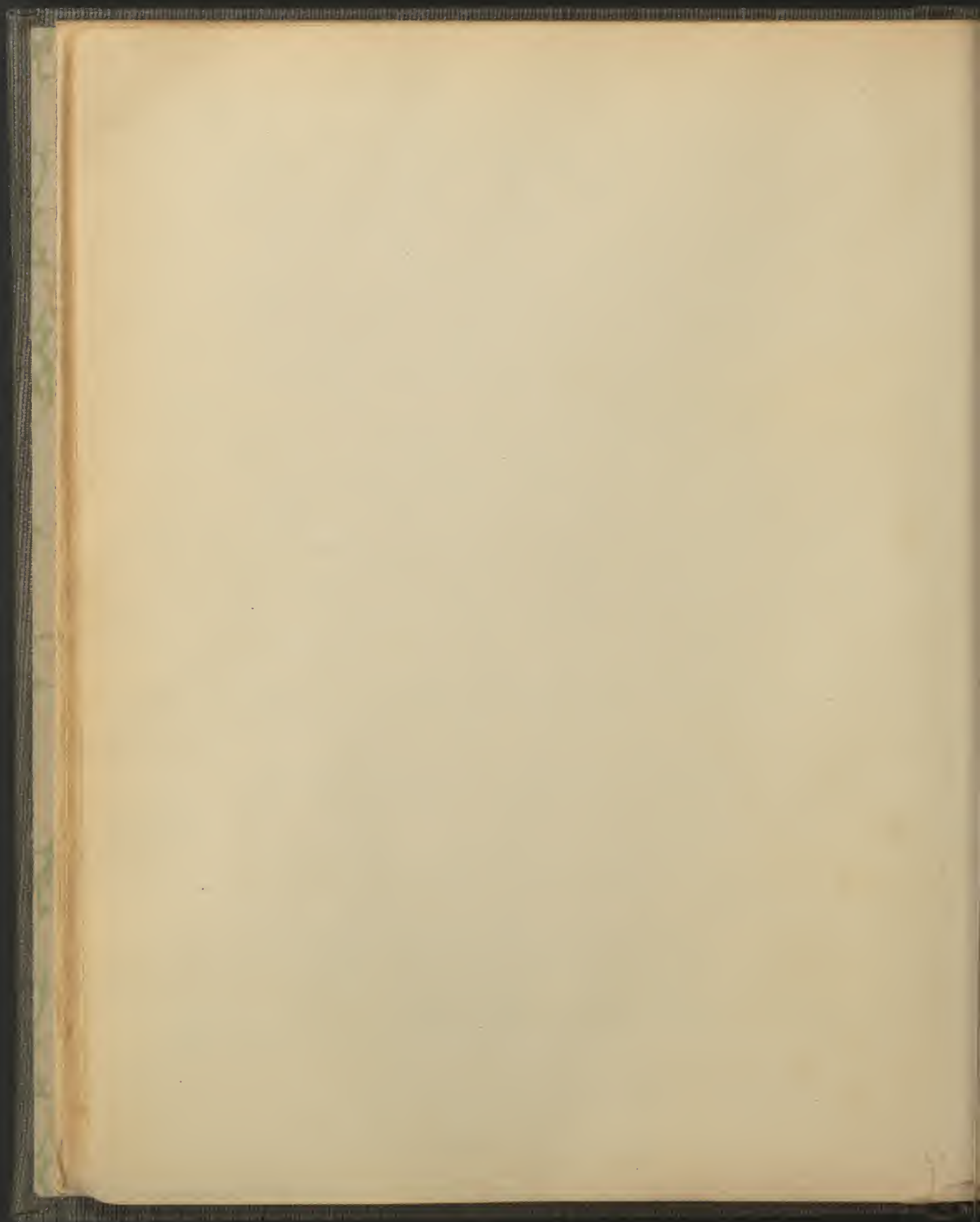
The posterior ligament is attached above to the back of the radius and below to the back of the bones of the condyle. The internal lateral ligament passes from the styloid process of the ulna to the cuneiform and pisiform bones.

The external lateral ligament connects the styloid process of the radius with the scaphoid and trapezium.

The joint is strengthened by no muscles though many tendons run over it they are too slender lax and free to give support.

The movements are flexion, extension, abduction, adduction and circumduction. The mechanism of these is as follows.

In flexion the condyle moves backward in its cavity and presses against the posterior ligament which may be ruptured by exaggerated motion producing dislocation backward of the corpus and



this may be occasioned by a fall on the back of the hand when it is flexed, i.e. when it is bent forward on the forearm.

Extension is the reverse of flexion.

In abduction the hand is moved away from the middle line, the condyle moving inward.

Adduction is the reverse of abduction.

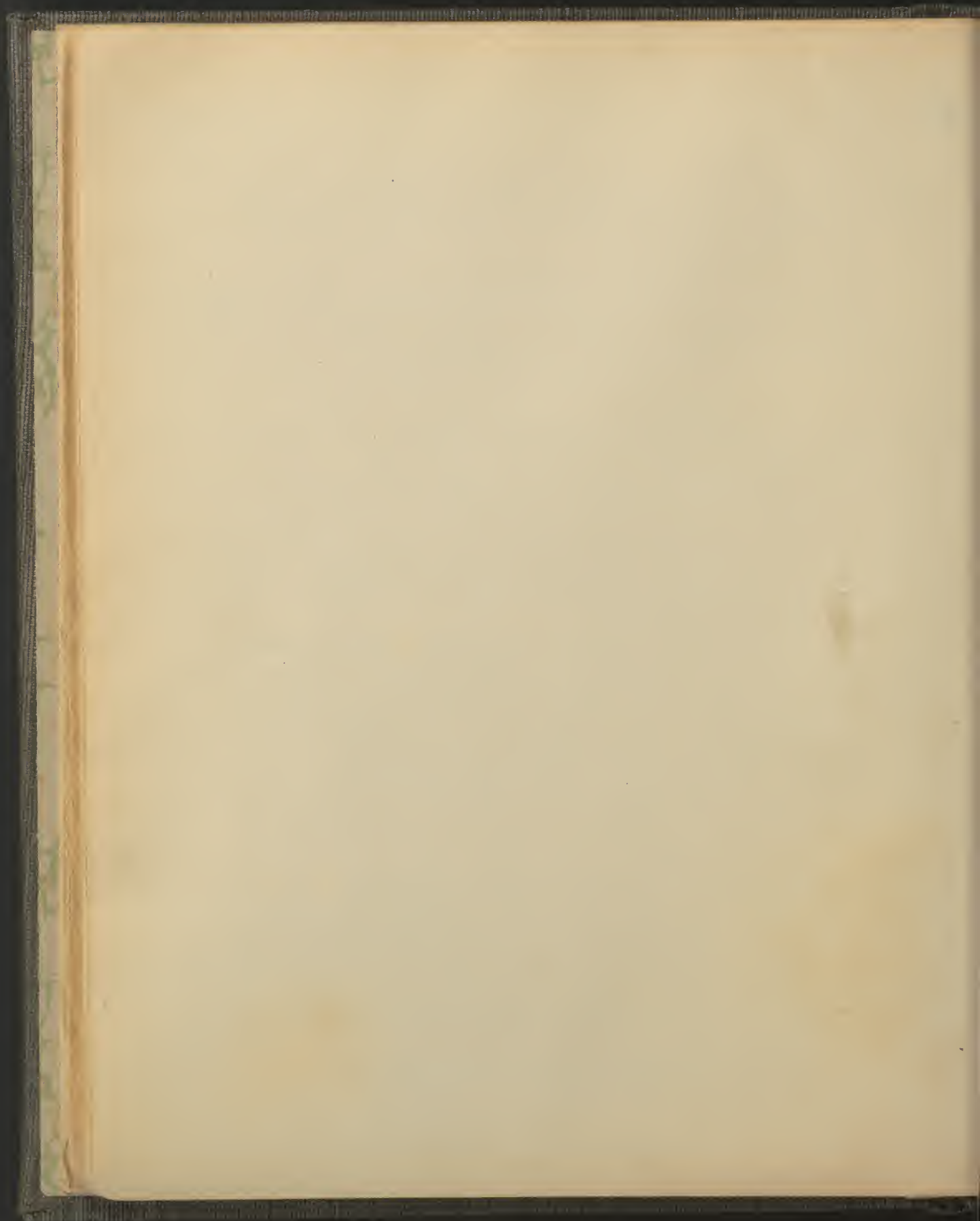
- The Articulations of the Carpus & Metacarpus -
The bones of the carpus which lie in the same row are held together by ligamentous fibres passing across them in front and behind, palmar and dorsal ligaments, and by fibres which seize the opposing surfaces of adjoining bones called interosseous; there being no interosseous ligament however between trapezium and trapezoid.

In the same manner the metacarpal bones of the four fingers are held to each other at their bases.

The two rows of carpal bones are bound together by ligamentous fibres passing from one to the other in front and behind, palmar and dorsal ligaments, and by two lateral ligaments, the external passing from scaphoid to trapezium, the internal from curviform to unciiform.

The metacarpal bones of the four fingers are attached to the second row of carpal bones by fibres in front and behind, palmar and dorsal ligaments and in one situation by interosseous fibres, extending from the adjacent parts of magnum and unciiform to the bases of the third and fourth metacarpal bones.

- The Trapezio-metacarpal Joint.



The articulation between the trapezium and metacarpal bone of the thumb belongs to the movable class and the saddle-shaped variety. It is invested by a capsular ligament and allows five movements, flexion, extension, abduction, adduction and circumduction.

- The Metacarpophalangeal Articulation.

The knuckle-joint, or metacarpophalangeal, is of the movable class and condyloid variety; the condyle is furnished by the head of the metacarpal bone and the receiving cavity by the top of the corresponding phalanx aided by a plate of cartilage known as the anterior ligament of the joint.

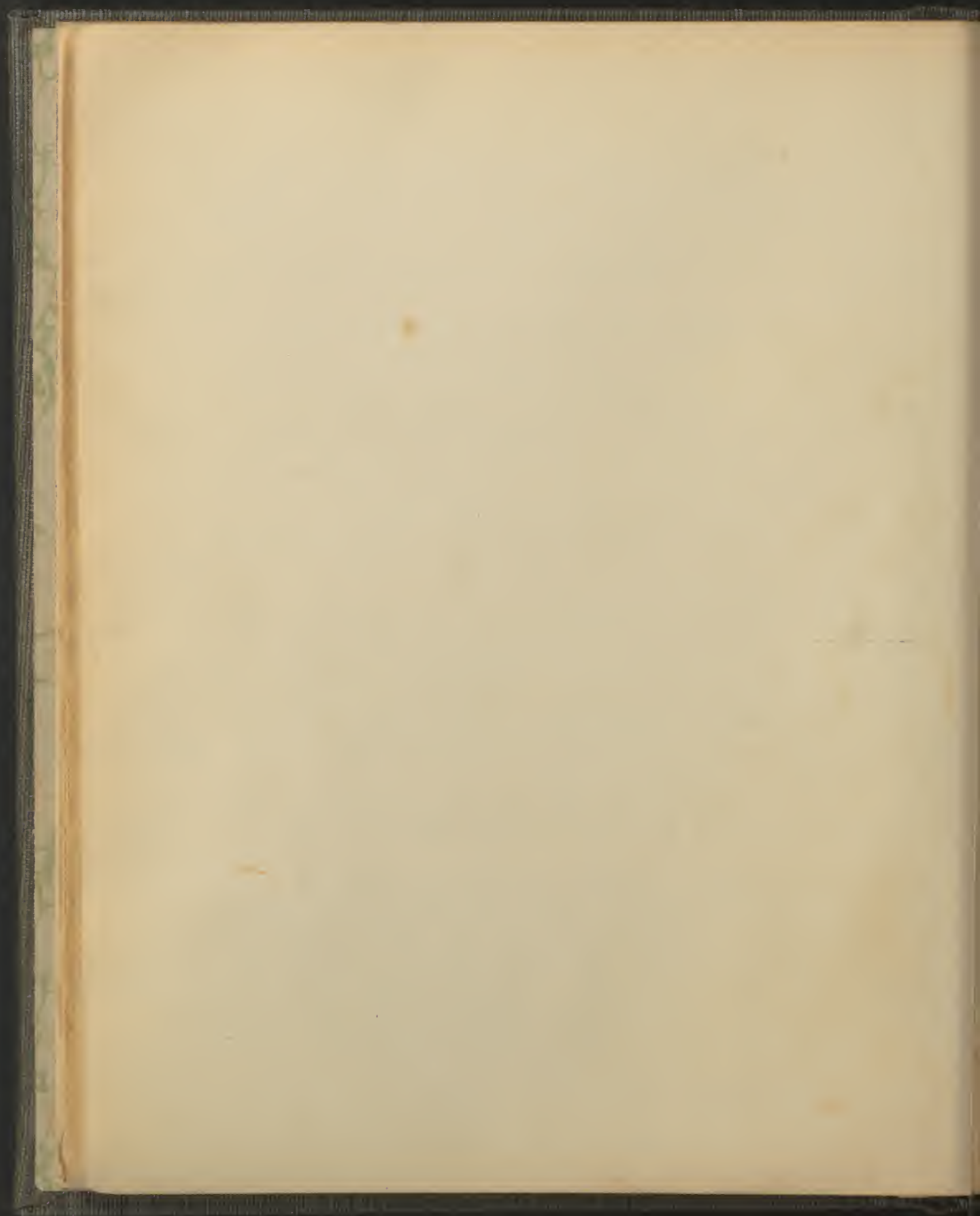
The ligaments of this joint are two lateral seizing both bones on their lateral aspect just beyond the articular surfaces.

The place of a posterior ligament is supplied by the extensor tendon of the finger and the anterior ligament is no ligament at all in the true sense of the word being only a mass of fibro-cartilaginous material attached to the front edge of the articular surface on the base of the phalanx and increasing the size of the receiving cavity.

The movements here are the four angular and their combinations circumduction.

- The Inter-phalangeal Articulation.

The articulation between two phalanges is of the movable class and hinge variety; the head of one phalanx presenting the trochlea and the base of the other the answering surface. The ligaments are exactly similar to those of the metacarpophalangeal.



34
langueal articulation but the movements are only flexion and extension.

Nov. 14 91
- The Hip Joint -

The hip joint is of the movable class and ball and socket variety, its bony elements being the acetabular cavity of the os innominatum and the upper extremity of the femur.

The acetabulum is a cup-shaped surface formed by the three bones which make up the os innominatum, the ischium contributes rather more than two-fifths of it, the ilium rather less than two-fifths and the pubes one fifth. Its margin is prominent except at the inner aspect where there exists a deep notch; leading to this notch is a rough depression in the bottom of the cavity.

Surmounting this margin in the fresh joint is a fibro-cartilaginous ring called the cotyloid ligament, which is continued over the notch in the margin, the part stretched over the notch being known as the transverse ligament. Occupying the depression in the bottom of the acetabulum is a cushion of fatty tissue.

The femur furnishes a head forming about two-thirds of a sphere, having just behind and beneath its centre a rough depression; supporting the head is the neck which is directed obliquely upward and inward from the shaft, the degree of obliquity varying with age and sex; its slenderest part is just above the centre, whence it dilates in both directions but much more toward the shaft; its greatest diameter is vertical and its upper border

Fig. 10 is surrounded by a fold of the superior
membrane.

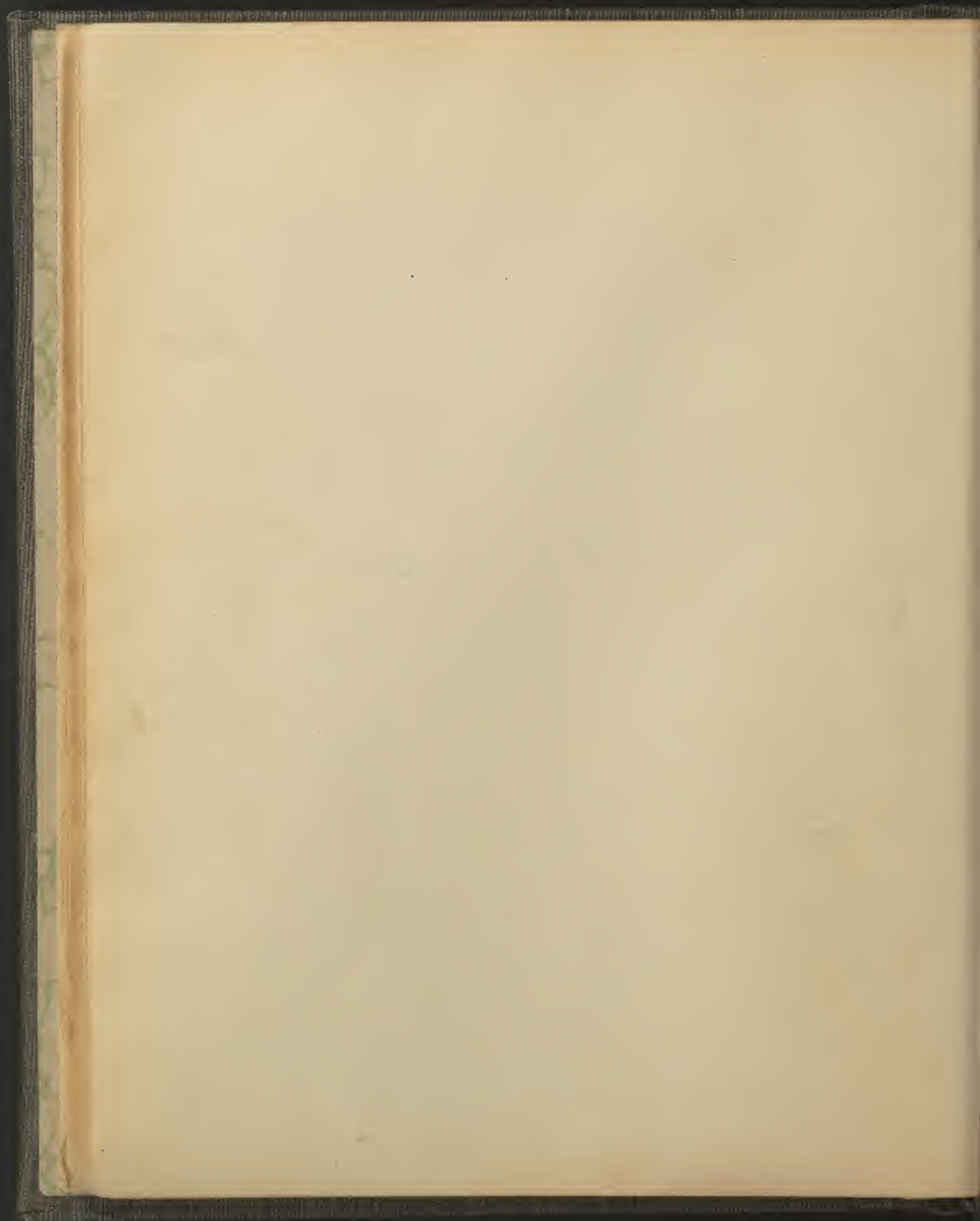
is much the shorter and terminates at the greater trochanter, while the lower border terminates at the lesser trochanter; connecting the trochanters behind is the posterior inter-trochanteric line.

The ligaments which bind together the bony elements of this joint are capsular and ligamentum teres. The capsular ligament encloses the joint closely and its length is such as to keep the bony surfaces in contact, thus differing from the long, loose ligament of the shoulder. It is attached above to the rim of the acetabulum and below to the neck of the femur, extending in front the whole length of the neck but behind it is attached some 1/2 inch short of the anterior intertrochanteric line. The upper part of the capsular ligament is much thicker than the rest, some five times; thus receiving the support of what is called the ilio-femoral ligament attached above to anterior inferior spinous process of the ilium and below to the spiral line of the femur and front of the greater trochanter.

The ^{round ligament} ligamentum teres is a cord of fibres, which starting from the rough depression on the head of the femur, forks to be attached to the sides of the notch in the margin of the acetabulum - (C) at a distance of the acetabulum.

Efficient to the amount of about twenty-six pounds in retaining the head of the femur in the acetabulum is atmospheric pressure by virtue of the exact molding of the socket on the ball, the head of the femur fitting air-tight in the acetabulum.

The muscles which strengthen this joint are Above, Rectus and gluteus minimus.



In front, Psoas Magnus, and Iliacus Internus.

Internally, Pectineus and Obturator Externus.

Behind, The outward Rotators of the thigh, (Obturator internus and externus, ^{4th} pyriform the gemelli and quadratus femoris.) & ^{1st} Gluteus medius.

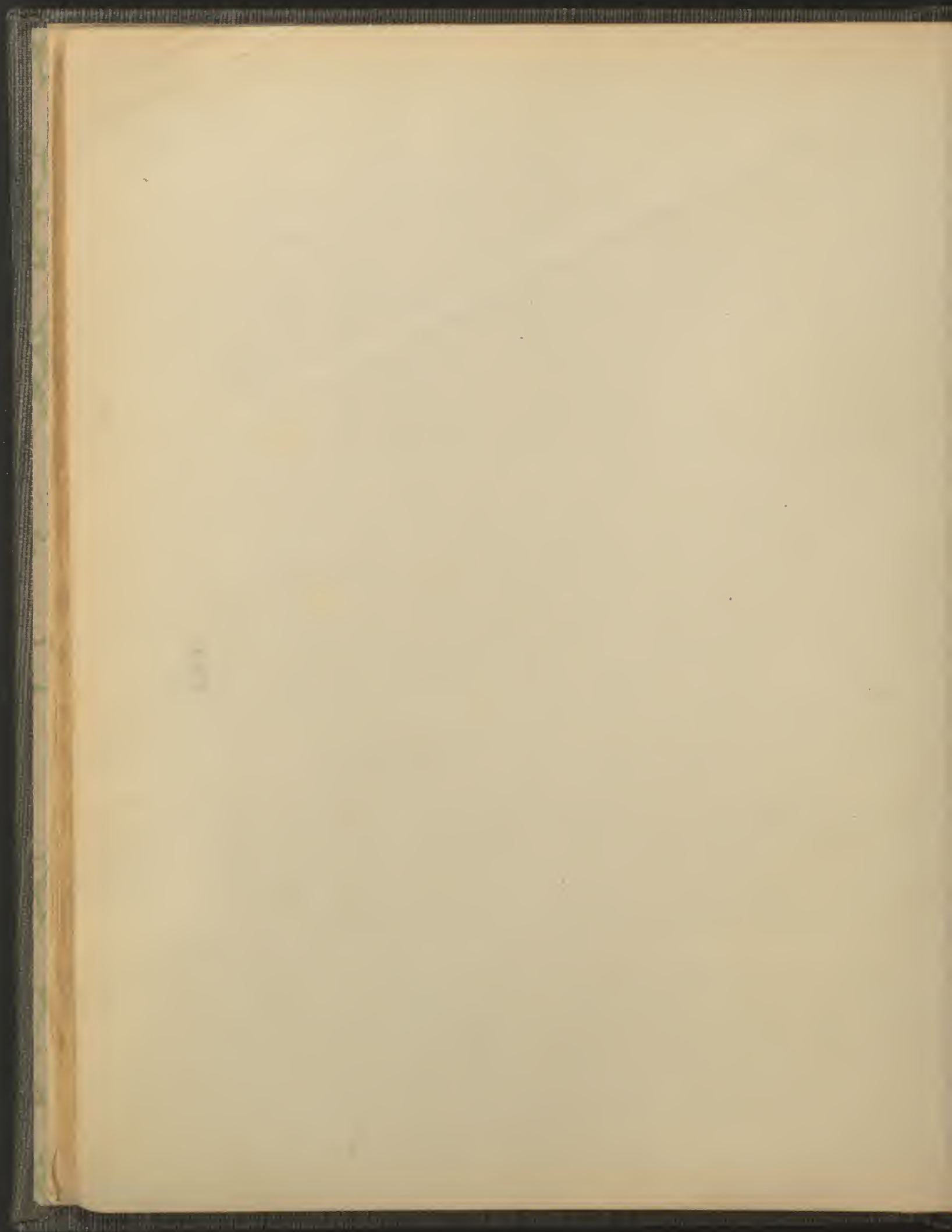
Or beginning at random and giving these muscles in the order in which they successively lie around the joint we have gluteus minimus, rectus, iliacus internus, psoas magnus, pectineus, obturator externus, quadratus femoris, gemellus inferior, obturator internus, gemellus superior and pyriformis. this is the order in which they curl.

The movements at this joint are six in number and are the same as those at the shoulder, their mechanism being also the same. As there dislocation here occurs by exaggerated motion in adduction and abduction though it usually occurs from indirect violence, as in a fall on the foot or knee while the joint is in a state of adduction, thus rupturing the upper part of the capsular ligament notwithstanding its immense thickness.

- The Knee-Joint -

The knee, the largest and most important joint in the body, belongs to the movable class and hinge variety. The bony elements are the lower extremity of the femur above, the upper extremity of the tibia below and the posterior surface of the patella in front.

The lower extremity of the femur presents the articular surfaces of its condyles, external and internal, the internal being the longer and narrower.



each condyle bears on its free face the prominence known as the tuberosity, external or internal; just beneath the external is a depression for the origin of the popliteus muscle. Separating the two condyles in front is a smooth shallow articular groove; this together with the two condyles forms a pulley; behind the two condyles are separated by a deep non-articular depression called the intercondylar notch, which is continuous with the groove of the pulley.

The upper extremity of the tibia is surmounted by two shallow articular depressions called glenoid cavities external and internal, separated by a bifid upward projection, the spine of dissimilar shape since the condyles of the femur play on them, each assumes the outline of the corresponding condyle: i.e. the external is nearly circular while the internal is oval with its long diameter antero-posterior.

Supporting the glenoid cavities are the tuberosities internal and external; the external marked by an articular facet for the upper extremity of the fibula and the internal by a horizontal groove for semi-membranous. On the front of the tibia, just below the glenoid cavities and separated from them by a triangular surface is the anterior tubercle.

The posterior surface of the patella is articular, consisting of two facets separated by a vertical ridge; these facets play on the condyle and as the external condyle is the broader so is the external of the two facets:-

Praxinosyllis cauda

note that post lig. is only attached
to the lateral lobe. post body post elbow

Lying on each of the glenoid cavities of the tibia is an imperfect plate of fibro-cartilage called semilunar external or internal. Each plate is thickest at its circumference and slopes off to a thin edge towards the centre of the glenoid cavity on which it lies. The internal is oval with its long diameter antero-posterior and its two extremities terminate at the beginning of the depression in front and behind the spine. The external is nearly circular and its extremities terminate at the base of the spine, in front and behind, as it were between those of the internal.

The circumference of each plate is held down on the margin of the glenoid cavity by short vertical fibres, these forming what is called the coronary ligament; right or left. Passing across from the most prominent part of one semilunar plate to the other anteriorly is a small cord the transverse ligament.

The ligaments which bind the bones together are anterior, posterior, two crucial and three lateral, two external and one internal.

The anterior ligament is known as the ligamentum patellae and extends from the lower end of the patella to the anterior tubercle of the tibia; the patella being held to the femur by the attachment of the biceps extensor.

The posterior ligament, or ligament of Trisulow, covers the whole of the back of the joint, being attached above to the back of the femur above the condyles and below to the back of the tibia; its middle portion is furnished by the tendon of the

Int. lat. leg - attached to shaft of lutea
gives same fibres to int. tubercosity -
is a branch to same lutea lutea: - 45-

Injection of same membrane
in lutea & tubercosity in lutea
} part of, lutea lutea lutea

above & below lutea lutea
lutea lutea lutea lutea lutea lutea
lutea

It is formed by *propr.*

39

semi-membranous. oblique fibres which intersect.

The internal lateral ligament is a flattened band of fibres attached to the inner tuberosity of the femur above and the inner tuberosity of the tibia below. The long external lateral ligament extends as a round cord from the external tuberosity of the femur to the head of the fibula.

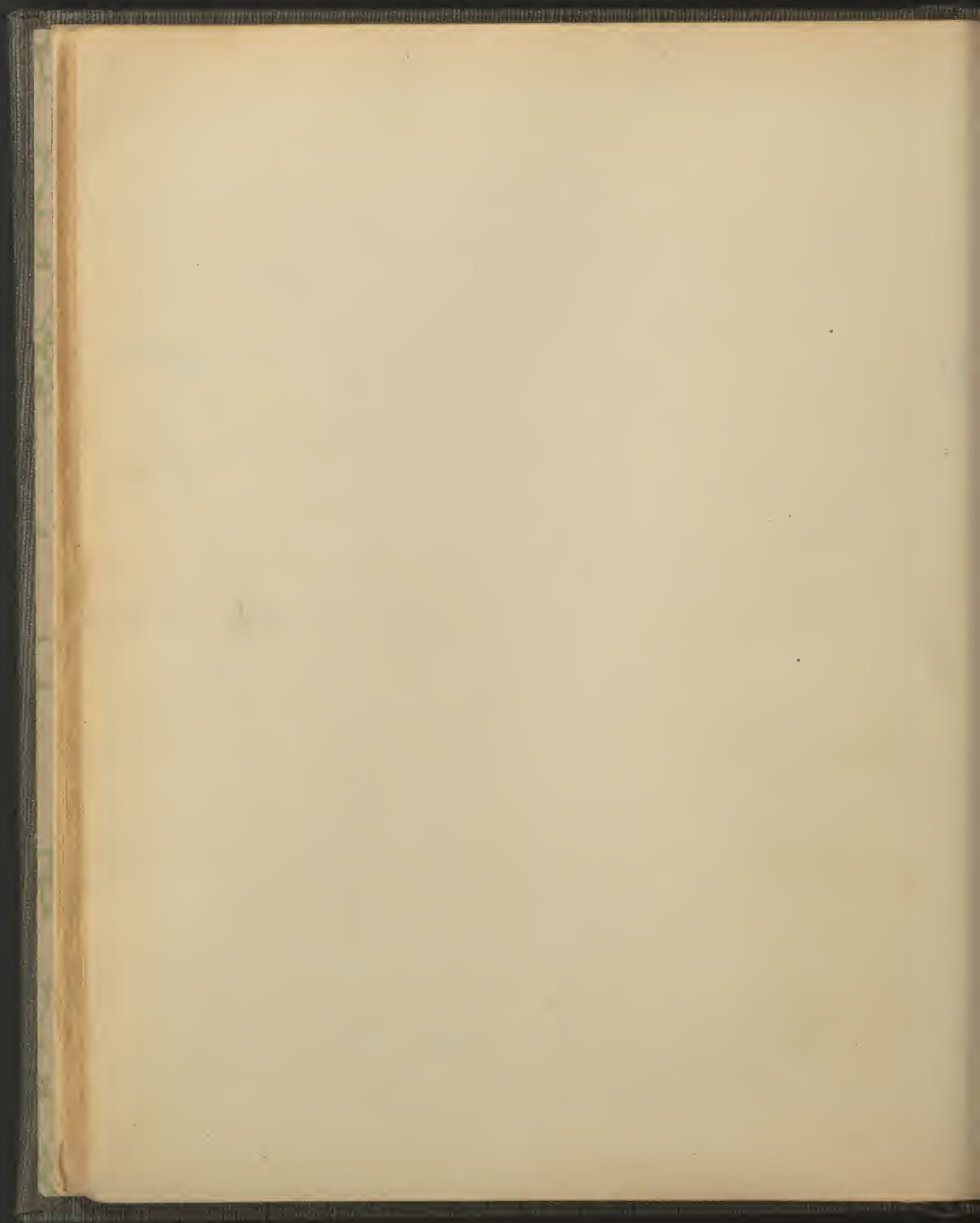
The short external lateral ligament lies behind the long and has the same attachments as it. It is the tendon of origin of the popliteus, which connects with the head of the fibula.

The two crucial ligaments are found within the joint and are distinguished as anterior or external and posterior or internal. The anterior is attached to the tibia in front of its spine and passes upward, outward and backward to seize the inner face of the external condyle of the femur.

The posterior is attached to the tibia just behind the spine and passes upward, forward and inward to lay hold of the outer side of the internal condyle of the femur.

The two crucial ligaments decussate in the joint, hence their name, and are connected where they cross.

Besides the foregoing ligaments there are other so-called ones, though they are not true ligaments and exert little or no influence to hold the bones together. Stretching from the notch between the condyles of the femur to a mass of fat which lies behind the ligamentum patellae is a fold of synovial membrane which has been called ligamentum cruciatum and the lower edges of this fold or cord are known as the alar ligaments.



The Synovial Membrane of the knee is the most extensive in the body; it is not only sufficient for the joint itself but extends upon the front of the femur from an inch to two inches above the articular surface. It is worthy of note that the synovial sac is not in contact with the anterior face of the ligamentum patellae but is separated from it by a mass of fatty tissue.

Investing all these structures is the continuation of the fascia lata over the joint to become the deep fascia of the leg.

The muscles which strengthen the joint are:

In front, triceps extensor.

Behind, the gastrocnemius, popliteus and semi-membranous.

Externally the tendon of the biceps flexor. *triceps extensor*

The movements at this joint are flexion and extension.

In flexion, the leg is raised backward on the thigh, the glenoid cavities of the tibia moving backward on the condyles: the movement is checked when the leg is in contact with the back of the thigh.

Extension is the reverse of flexion.

It should be observed that in a state of semi-flexion the knee-joint is capable of slight movement or rotation as in eversion or inversion of the foot.

- The Ankle Joint.

The ankle joint belongs to the movable class and hinge variety; its articular surfaces being contributed by the lower extremity of the tibia and lower extremity of the fibula above and by the upper surface

note that the ant. lig. is only attached
to the tibia in front.

The fibula has no att for ant or post ligat^{anterior}

crust joints

51

of the astragalus below.

The lower extremity of the tibia presents the outer malleolus which has on its inner aspect a triangular articular facet.

The upper surface of the astragalus presents an unsymmetrical pulley; the sides of the astragalus being each marked by an articular facet the outer being the larger and more triangular; these being intended for the play of the malleoli; the astragalus being grasped between them in such manner as to produce what has been called a tenon and mortice joint.

The ligaments of the joint are an anterior and two lateral, internal and external.

The anterior ligament, thin and fatty extends from the front of the tibia to the astragalus in front of its pulley.

The internal lateral or deltoid ligament, triangular in shape, is attached above by its apex to the inner malleolus while below its base seizes the scaphoid astragalus and os calcis. This ligament when cut through is seen to consist of two layers and is immensely strong.

The external lateral ligament is in point of fact three distinct ligaments though always described as consisting of three fasciculi anterior, middle and posterior.

The anterior fasciculus extends from the outer malleolus to the astragalus in front. The middle fasciculus passes from the outer malleolus downward to the outer side of the os calcis. The posterior fasciculus is stretched between the inner aspect of the outer malleolus posteriorly to the astragalus behind. ✓

opposed to no dis union / 5

The place of a posterior ligament in this joint is supplied by the tendo Achillis. ~~also the transverse~~. The movements are flexion and extension - In flexion the foot is raised forward on the leg, the astragalus moving backward on its receiving surface. Extension is the reverse of flexion. It is a disputed point whether in inversion and eversion of the foot there is any lateral movement at the ankle joint.

- The Tibio-fibular Articulation -

Extended between the adjacent edges of the tibia and fibula from just below the knee to the ankle joint is a strong ligamentous membrane called the interosseous membrane, the direction of the fibres being downward and outward. In the upper part of this membrane is seen the aperture for the transmission of the anterior tibial artery.

Besides the interosseous membrane the tibia and fibula are held together both at their upper and lower extremities.

The upper extremity or head of the fibula presents a more or less circular articular facet which plays on a corresponding one situated on the outer tuberosity of the tibia; the bones being here held together by an anterior and a posterior ligament, which passes from one bone to the other in front or behind.

The synovial membrane of this joint frequently communicates with that of the knee.

The outer aspect of the lower extremity of the tibia presents a rough surface which has a corresponding one on the inner face of the lower extremity of the fibula situated just above the articular inner face of the

270 809 -

D.R.E

See Group 5

Post. Lig. from post. Surf of astr.
to up. surf. of re calciv.

malleolar process. It must be observed that there is a very narrow articular surface just below the rough surface of the tibia.

The ligaments are here found to be an anterior and a posterior like those at the upper extremities of the bones and besides these a large mass of interosseous fibres which pass between the adjacent rough surfaces.

- The Articulations of the Tarsus -

The articulations of the tarsus consist of the articulation of the bones of each row and of the union of the two rows.

1st Row.

- Calcaneus - astragaloid articulation -

The two bones of the first row of the tarsus are held together by three ligaments, external, posterior and interosseous.

The external calcaneus - astragaloid ligament descends from the outer side of the astragalus to the outer side of the os calcis.

The interosseous ligament is by far the most important bond of union between the two bones; it consists of a large number of fibres filling the sinus tarsi and passing directly and obliquely between the surfaces contributed to form that canal.

- The Articulations between the bones of the 2^d Row.

The bones of the second row of the tarsus are held in union by fibres across their dorsal and plantar faces and by interosseous fibres between opposing surfaces.

- The Articulations between the two Rows -

The two rows of the tarsus are held together by three sets of ligaments, two sets springing from the os calcis, to the cuboid and to the scaphoid though it does not articulate with it, and one set between the astragalus and scaphoid.

- The ligaments between Os calcis and cuboid.

The ligaments which hold the os calcis to the cuboid are four, two on the dorsum of the foot and two in the sole. The superior calcaneo-cuboid ligament is attached to the upper front of the os calcis and to the inner upper part of the cuboid. This ligament is attached to the os calcis in common with the superior calcaneo-scaphoid ligament, the two ligaments diverging from this attachment and forming the "Y" ligament. Nay
of

The long inferior calcaneo-cuboid ligament is attached behind to the under surface of the os calcis and in front to the under surface of the cuboid and based on adjacent metatarsal bones, 2^d 3^d & 4th; covering in as it passes forward the groove in which lies the tendon of the peroneus longus muscle. Intertub. C. C. Lig.

The short inferior calcaneo-cuboid ligament lies deeper than the long and extends between the under front part of the os calcis and the cuboid bone. (U) Bone uniting behind in tendon of the peroneus.

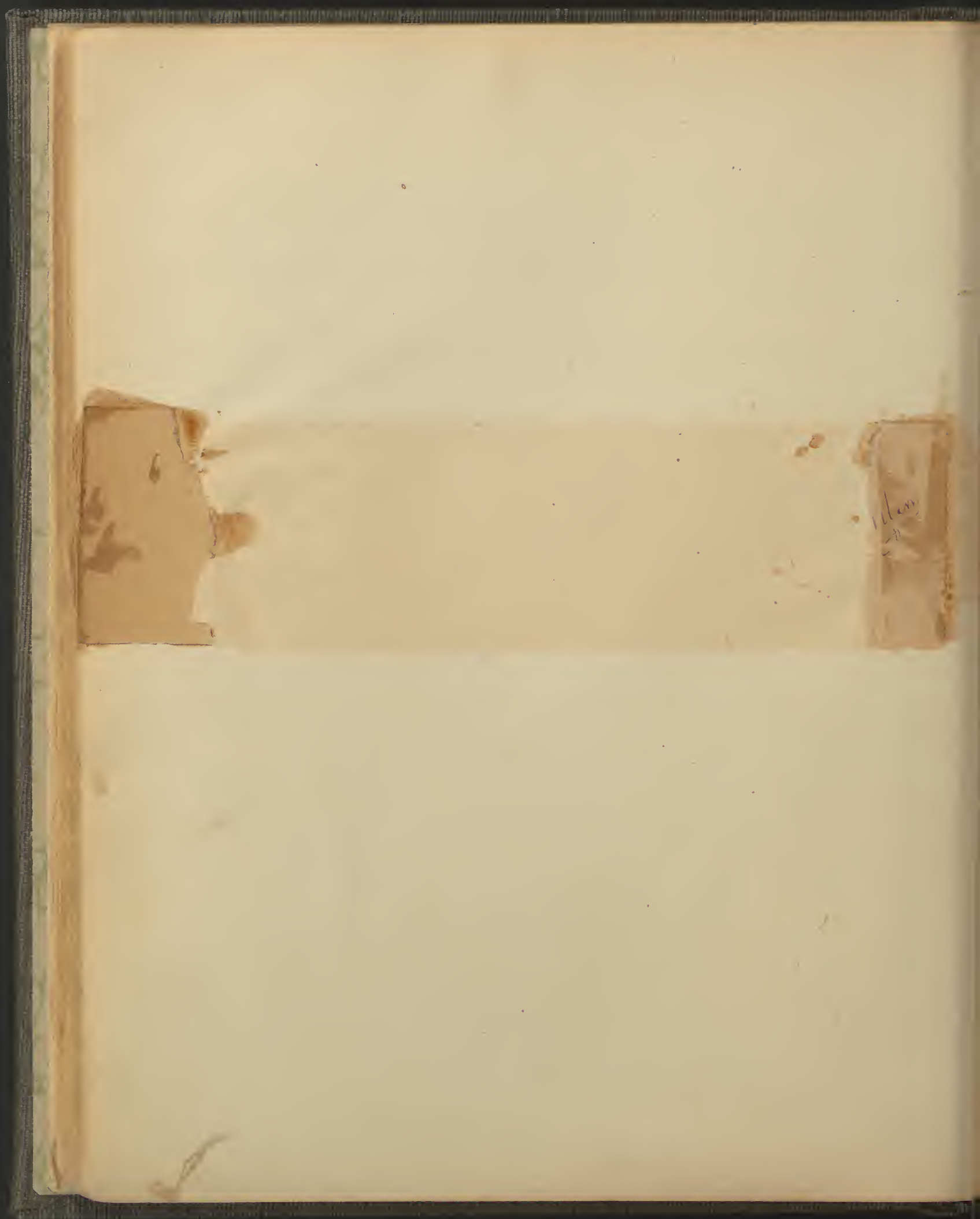
- The ligaments between the Os calcis & Scaphoid.

Connecting the os calcis and scaphoid are two ligaments, superior and inferior calcaneo-scaphoid.

The superior, one arm of the "Y" ligament, passes forward and inward from the front upper part of the os calcis to the scaphoid bone. = Ashcroft's Scaphoid

The inferior calcaneo-scaphoid ligament is much stronger.

The Sup. " " " Lig.



The Sustentaculum Tali

Supporting it 46

er than the superior and passes from the inner front aspect of the os calcis beneath the head of the astragalus to the under surface of the scaphoid. Relaxation causing "flat foot"

- The Astragalo-scapoid Articulation -

The only ligament connecting the astragalus to the scaphoid is the superior astragalo-scapoid which is thin and weak, and passes from the neck of the astragalus to the upper surface of the scaphoid.

- The Tarsal-Metatarsal Articulation -

The 1st metatarsal bone articulating with the internal cuneiform bone; the 2^d with the middle cuneiform by its base and has lateral facets for articulation with the internal and external cuneiform bones, being jammed between these and extending farther back than the other metatarsal bones; the 3^d metatarsal bone articulates with the external cuneiform; the 4th and 5th with the cuboid bone.

The tarsus is held to the metatarsus by ligamentous dorsal and plantar fibres and by three interosseous ligaments; one from the internal cuneiform bone to the 2^d metatarsal bone; one from the external cuneiform to the 2^d metatarsal bone and one from the external cuneiform to the 3^d metatarsal.

The metatarsophalangeal, the interphalangeal and "intermetatarsal" articulations of the foot are exactly similar to those of the hand, which see

Gift to Miss 842 1/2

Passes along the lower side of the
Lug 2/2

- The Viscera -

- The Alimentary Canal and Appendages -

The Alimentary Canal begins at the mouth and ends at the anus, the intermediate portions being found in the neck, thorax and abdomen. In the neck are the fauces, pharynx and part of the oesophagus; in the thorax is the remaining portion of the oesophagus; the rest of the canal is found in the abdomen and will be described with that cavity.

- The Mouth -

The mouth extends from the lips in front to terminate behind in a short constricted portion of the canal, called the fauces. It is bounded above by the hard palate, below by the tongue; on each side by the cheek.

The lips are two, upper and lower separated by a transverse fissure called the labial. Each is formed chiefly by its segment of the orbicularis oris muscle, covered externally by skin and internally by mucous membrane; a crescentic fold of which extends in the middle line from each lip to the gum behind and called fraenum labii. The cheek consists principally of the buccinator muscle, covered externally by skin, and internally by mucous membrane, which is reflected from it to the gum, and which presents opposite the second molar tooth of the upper jaw the opening on a papilla are ^{two's} ~~the~~ ^{Salivary} duct from the parotid gland. The hard palate is formed anteriorly by the meeting in the middle line of the palate processes of the superior maxillary bone and posteriorly by the meeting in the middle line of the horizontal plates of the palate bone. It is bounded in front and at the sides by the alveolar processes of the

20-540-9

superior maxillary bones containing the teeth of the upper jaw. It is covered by mucous membrane both above and below forming the floor of the nasal fossae above and the roof of the mouth below; on the latter aspect the mucous membrane is roughened by glands called palatinal and is continued on to the gums.

The floor of the mouth is formed by the anterior two thirds of the tongue; the posterior third of the tongue forms the floor of the fauces and below that enters into the formation of the anterior wall of the pharynx. The tongue is flattened from above downward, is conical in shape and is curved in direction, being convex above from before backwards and extends from the hyoid bone behind to the incisor teeth of the lower jaw in front, its base is adherent to the hyoid bone and its apex is free and anterior. It is formed chiefly of muscular fibres, some of which are wholly confined to the organ and called intrinsic muscles of the tongue, the others are the attachment to the tongue of muscles belonging to other parts and of other muscles, called extrinsic muscles of the tongue, which arise from neighboring parts and are inserted into the tongue. The tongue is covered on its superior surface or dorsum and on its sides by mucous membrane; running through it from before backwards is a vertical fibrous septum dividing it into symmetrical halves, which is thicker behind than in front.

The intrinsic muscular tissue in each half consists of transverse and longitudinal fibres, transverse and longitudinal lingualis.

The lingualis longitudinalis consists of fibres which extend from the hyoid bone to which they are attached, to the tip of the tongue and are formed in a superficial

[1] 2

Imperata Trans. per. 1
" " Scap. 1
" " Natural

Prayer from our mother
and all of them

Gen. Rep. from 1872
Photo. from 51 page

layer both on the upper and lower surfaces of the organ; these two layers being separated by the lingualis transversalis, which consists of fibres attached to the fibrous septum and running out to the edge of the tongue.

The so-called vertical lingualis is simply the continuation of the fibres of certain extrinsic muscles of the tongue, and indeed the longitudinal lingualis seems to consist largely of such fibres.

The intrinsic muscles of the tongue are stylo-glossus, hyoglossus and two others, one of which, the Geniohyoglossus, belongs also with the elevators of the hyoid bone and is there described, the other the Palato-glossus is considered with the soft Palate.

- Stylo-Glossus -

The Stylo-glossus arises from the tip of the styloid process of the temporal bone and running downward and forward as a narrow band is lost on the side of the tongue.
Action - It draws the tongue backward into the mouth.

- Hyoglossus -

The hyoglossus is a flat quadrilateral muscle, which arises from the body and both cornua of the hyoid bone and passing directly upward is inserted into the side of the tongue, to the inner side of the stylo-glossus -

Action - It carries the tongue downward and backward, increasing the size of the fauces - The mucous membrane, covering the dorsum of the tongue, passes around the sides and beneath the tip, thus enveloping most of the organ; it leaves the lower surface to become continuous with that lining the gums of the lower jaw. In contact with the posterior part of the dorsum is the front of

the Epiglottis, which is held to it by three folds of mucous membrane, the glosso-epiglottic ligaments, middle and two lateral.

- The Fauces -

The fauces, or isthmus of the fauces is that narrow part of the alimentary canal connecting the mouth posteriorly, with the front of the pharynx - It is about one and a half inch long, about the same in width and rather less in depth; the size, however, varying greatly, for its walls are chiefly formed of muscular tissue, which is peculiarly subject to reflex action.

The roof of the fauces is the soft palate; the floor is a part of the dorsum of the tongue; the side is formed by two arching muscles and between them the tonsil gland; the muscle in front is the palato-glossus, forming the so-called anterior pillar of the fauces; the one behind is the palato-pharyngeus, forming the posterior pillar of the fauces.

The wall in every aspect being covered by mucous membrane.

- Soft Palate -

The soft palate, or velum pendulum palati is thin and flattened from above downward and forward - It is attached above to the posterior border of the hard palate and hangs downward and backward, separating the fauces from the upper part of the pharynx - It is prolonged, in the middle line below by a nipple-like projection, some half inch long, called the uvula.

It is made up chiefly of muscle, tissue and tendon, covered on both faces by mucous membrane, which, above, is continuous with that lining the nasal fossa and

Quadrilateral portion of the apex of the
Polaris portion of the Urop

between these two is the superior crumple
of the Olanys

below with that of the fauces and mouth. The proper muscles of the soft palate are three, the levator palati, the tensor palati, the uvulae uvulae: but besides these there are two others which have their origin in the soft palate, the palato-glossus and the palato-pharyngeus.

- Levator Palati-

The levator palati arises from the rough surface on the basilar face of the petrous portion of the temporal bone next its apex and from the cartilaginous portion of the Eustachian tube and descends to be lost in the soft palate; its name indicating its action.

- Tensor Palati-

The tensor palati is a small flat muscle which forms a right angle on itself, hence its synonyme of circumflexus. It arises from the scaphoid fossa of the styloid process from the spinous process of the ethmoid bone and from the cartilaginous portion of the eustachian tube and first descending vertically it then turns transversely inward around the hamular process and spreads out as a broad aponeurosis in the soft palate - Its name indicates its action.

- Uvulae - or uvula.

Pendulous from the posterior termination of the soft palate in the centre is a conical short mass known as the uvula, which when dissected is found to consist of mucous membrane exteriorly and interiorly of a pair of minute muscles, each of which arises from the palate spine and descending beside its fellow is lost in the mucous membrane of the uvula; these two muscles were formerly considered as one

is classed with longan trees

Longan tree

51

and hence their name *agygae uvulae*; it is their presence in the uvula which accounts for its constant and varied movement.

-- Palato-glossus --

The palato-glossus muscle arises in the soft palate and passing downward and forward terminates in the side of the tongue.

Action - It constricts the fauces hence its synonyme of constrictor isthmus faucium; it can also depress the soft palate.

-- Palato-pharyngeus --

The palato-pharyngeus arises in the soft palate and passing downward and backward, and enters the wall of the pharynx, where some of its fibres are lost while the rest are inserted into the posterior border of the thyroid cartilage - Its action is the same as that of the palato-glossus, hence its synonyme constrictor isthmus faucium posterior.

-- Pharynx --

Food in order to reach the stomach passes through four successive portions of the alimentary canal the first two of these have been described, viz, the mouth and fauces; leaving the fauces the food enters the pharynx, traversing which it is received by the oesophagus in which the pharynx terminates; the oesophagus conveying it into the stomach.

But the pharynx not only serves as a channel for the food in its passage to the stomach.

It also conducts air from the nostrils to the larynx and as the nostrils are above the mouth and fauces so the pharynx must also extend upward beyond them and it does extend to the base of the skull to the basilar process.

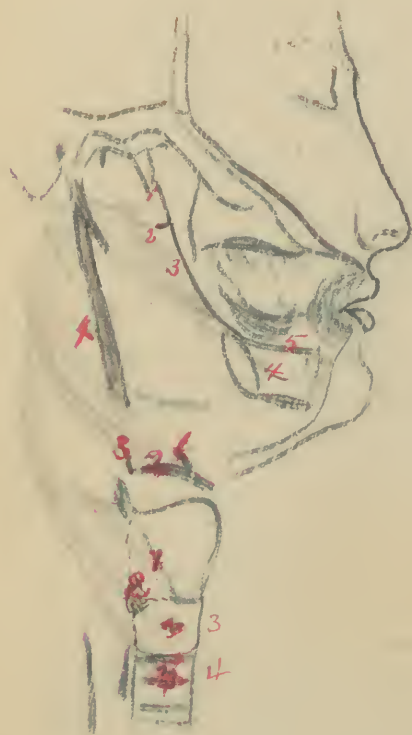
5th = Cervical vertebra 95
front of body =

of the occipital bone in order to receive the air which flows into it from the nostrils through the posterior nares and which it transmits to the larynx the opening into which is found on the front of the pharynx just below the opening of the fauces. And again the air which the tympanic cavity of each ear contains is supplied through the eustachian tube of each side by the pharynx, these two tubes opening into the upper front portion of the pharynx just behind the posterior nares. So that we find seven openings into the pharynx and of these let it be observed that six communicate with the front of the pharynx, viz. the two posterior nares, the two Eustachian tubes and the opening of the fauces and the opening into the larynx; the seventh is the termination inferiorly of the pharynx in the oesophagus. We thus see that the pharynx reaches from the base of the skull to the oesophagus which begins on the front of the body of the 5th cervical vertebra, i.e. at the same level with the termination of the larynx, which lies on the front of the pharynx and with the commencement of the trachea which lies on its front; thus making the pharynx about $4\frac{1}{2}$ inches long - tapering as it descends from the skull along the front of the bodies of the 5 upper cervical vertebrae.

- Structure -

The pharynx is lined by mucous membrane resting on a thin fibrous coat, external to the mucous coat is a muscular coat consisting like the intestines of circular and longitudinal fibres but differing in this that the muscular fibres are here red and not pale and are gathered into bundles which separate bundles are in fact described as distributed muscles. The circular fibres are placed in

Inferior articulation of point of origin
 Middle " " " "
 Superior " " " "



the flattened bundles on each side each bundle meeting its fellow of the opposite side on the centre of the back of the pharynx where they are continuous forming a raphe and each pair of bundles overlaps the lower edge of the pair above; these fibres again differ from those of the intestines in that when traced from the raphe forward they are found not to encircle the entire pharynx but to pass forward from its sides to seek firm neighbouring points of attachment from which to exert traction thus leaving the front of the pharynx devoid of muscular fibres this part of its wall being formed of mucous membrane alone, and since as we have seen that the larynx is in contact with the lower part of the front of the pharynx as it rests on the mucous membrane and is moreover embraced by the bundles of the circular fibres as they diverge from the front of the pharynx - Now since these circular fibres by their contraction lessen the diameter of the pharynx as they are known as constrictors of the pharynx and each bundle is described as a separate constrictor, as a muscle arising from points in front of the pharynx and running back to strike the side of the pharynx and meet the opposite muscle in the raphe on it backward as there are three of these bundles on each side from below up they are known as inferior, middle and superior constrictors of the pharynx - the direction of their fibres not being horizontally backward but in a general way backward and upward.

- Inferior Constrictor -

The inferior constrictor arises from the oblique line on the ala of the thyroid cartilage and surface behind.

Inf. cns.

The sup. laryng. art. and nerve pass near its upper border - The inf. laryng. nerve beneath its ~~left~~ lower to the larynx.

Middle constriction.

Separated from the sup. cns. by Stylo
pharynx. " " " " " " The

Sup. laryng. nerve.

Near its origin it is separated from the thyro gland which covers it by the laryngeal vessels.

it from the side of the cricoid cartilage and from the two upper rings of the trachea; it runs backward, its upper fibres ascending obliquely over-lapping the middle constrictor and is inserted into the raphe of the pharynx -

- Middle Constrictor -

The middle constrictor arises from the hyoid bone, both its cornua and from the stylo-hyoid ligament, which is a fibrous cord extending from the hyoid bone to the styloid process; the muscle radiates somewhat, spreads out on the side of the pharynx and is inserted into the raphe - The lower fibres are overlapped by the inferior constrictor while the upper fibres overlap in turn the superior constrictor and to such an extent that when viewed from behind very little of the superior constrictor can be seen and indeed the raphe of the middle constrictor is extended up to the basilar process -

- Superior Constrictor -

The superior constrictor lies just beneath the skull and is overlapped by the middle constrictor. It arises from the lower $\frac{1}{3}$ of the internal pterygoid plate from the hamular process of that plate, from the pterygo maxillary ligament from the extremity of the malar ridge of the lower jaw and by a few fibres from the side of the tongue: passing backward it is inserted into the raphe of the pharynx; the raphe of the two muscles being attached to the basilar process; The upper edge of this muscle presents a concave border thus leaving an arched interval between it and the skull above and over this interval the fibrous tissue beneath the mucous membrane of the pharynx is extended and is

Review of the

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here is much thickened as to form a strong fibrous mem-
brane. The opening is *Sinus of Morgagni*

The longitudinal muscular fibres of the pha-
rynx like the circular, are gathered into bundles two
pairs and these are described as distinct muscles
arising from points above the pharynx and descend-
ing to it. One of these muscles, the palato-pharynge-
us has already been described as forming part of the
soft palate - the other is known as the stylo-pharyngeus.

- Stylo-pharyngeus -

The stylo-pharyngeus arises from the inner side of
the base of the styloid process and descends to the side
of the pharynx, entering its wall between the mid-
dle and superior constrictors some of its fibres are
lost therein and some are continued on to be insert-
ed into the posterior border of the thyroid cartilage.
Action - It elevates and widens the pharynx.

- Oesophagus -

The oesophagus continues the course of the aliment-
ary canal from the termination of the pharynx, at
the commencement of the trachea and at the lower
border of the body of the 5th cervical vertebra, down the
front of the vertebral column through the neck and
thorax to pierce the diaphragm at the oesophageal
opening opposite the tenth dorsal vertebra and ter-
minate in the cardiac orifice of the stomach, being
about nine inches long.

Relations -

It first descends the front of the two lower cervical
and upper six dorsal vertebrae and then continues

Ryckel

2

Pen. magenta

Aggr. mag.

Pluma:

3. Arita - pen. magenta 7/11/2

Pen. magenta

Chama. 1/11/2

Pluma:

1/11/2
1/11/2
1/11/2
1/11/2

its course to its termination steadily diverging forward and to the left. It first lies on the middle line, but in the lower part of the neck and in the upper part of the thorax it curves slightly to the left, returning to the middle line about the 3^d dorsal vertebra which it follows to about the 6th dorsal vertebra, where it finally inclines to the left and forward.

For study of its relations it may be conveniently divided into three portions: the 1st portion extends from its commencement to opposite 1st dorsal vertebra and lies in the neck; the 2^d portion lies in the upper part of the thoracic cavity, in the back part of the superior mediastinum and extends from the 1st dorsal vertebra to the 6th; the 3^d portion extends from the 6th dorsal vertebra to its termination and lies in the posterior mediastinum.

The Relations of the 1st portion are as follows. In front is the trachea, slightly to the left of which it curves as it terminates: in the furrow between it and the trachea on each side is the recurrent laryngeal nerve; behind it is separated from the vertebral column by the longus colli muscle; on each side is the common carotid artery, the left being closer, owing to the curve of the oesophagus towards that side, it is also in relation laterally with the lower part of the lateral lobe of the thyroid gland.

The 2^d portion has the following relations. In front as far down as the 4th dorsal vertebra is the trachea, which separates it from the transverse part of the arch of the aorta, below this it has in front 1st the left bronchus and then the pericardium; behind it has the longus colli muscle separating it from the

11

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2291

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(3) left arm crook

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3rd Edition Exhibit

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4 in Cardam.

Course it is ^{much} ~~more~~ agree- every the society all things to

vertebral column: at its commencement it has to the right the terminal part of the innominate artery and to the left the termination of the 1^o portion of the left common carotid artery, and the 1^o portion of the left subclavian artery: to the left and slightly in front above, is the thoracic duct and in the groove between it and the trachea, is the left recurrent laryngeal nerve: also to the left, below, is the descending part of the arch of the aorta, and the commencement of the thoracic aorta: to the right of its lower part is the terminal portion of the right vena azygos: lastly it is covered laterally by the pleura.

The 3^d portion has the following relations: in front is the pericardium and the left pneumogastric nerve: behind it is the right pneumogastric nerve, the vena azygos major - some intercostal vein, the thoracic duct and at its lower part the thoracic aorta, its relations to which are these at its commencement it lies to the right of the aorta but at once inclines forward and to the left as as to get in front, so that at its termination it is in front of the aorta and slightly to the left. It is coated on each side by pleura.

Structure -

The oesophagus consists of three coats, two muscular and a serous: the muscular coats are external, longitudinal and internal circular. The longitudinal fibres are uniformly diffused around the tube through most of its extent, but above are gathered into three more or less distinct bundles, the front one is attached to the cricoid cartilage and the others are continuous with the pharynx: below this coat becomes continuous with the stomach. The circular fibres above

upper horizontal line is ^{the} end of 9th rib
Int. Sup 5. p of ^{2 lines} ^{is} place your
lower ^{horizontal} line -
2 vertical lines are lower from
middle of ^{points} ligament -

are continuous with the inferior constrictor of the pharynx and below with the stomach; this coat is separated from the mucous membrane lining the tube by sub-mucous connective tissue, sometimes called the areolar coat of the oesophagus.

The fibres of both muscular coats are, above, reddish, and distinctly striated, but below are pale and lose striation.

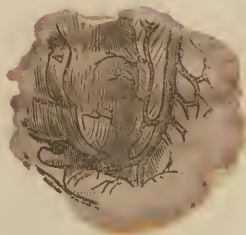
The mucous membrane is loose and thrown into longitudinal folds, when the tube is not distended; it presents the numerous minute orifices of the ducts of the oesophageal glands, which lie embedded in the submucous tissue.

The Abdominal Viscera-

The cavity of the abdomen is bounded above by the diaphragm, which is a thin arched muscle with its concavity downward, forming the floor of the cavity of the chest and the roof of the abdomen. The floor of the abdomen is the floor of the pelvis, the structures which close the outlet of the pelvis; occasionally it is said to be the iliac fossae and the brim of the pelvis, the true pelvis then being considered as a separate cavity. Laterally and in front, from the lower ribs above to the ilium below the abdominal wall is formed of soft tissues, muscles &c and is the soft fleshy front wall of the belly. At its upper part the cavity is partly circumscribed by the lower ribs, and last six or seven below it is surrounded by the bony wall of the pelvis, behind is the lumbar portion of the vertebral column, and on each side are above the floating ribs, below the pelvic wall and between these the soft tissues. For convenience

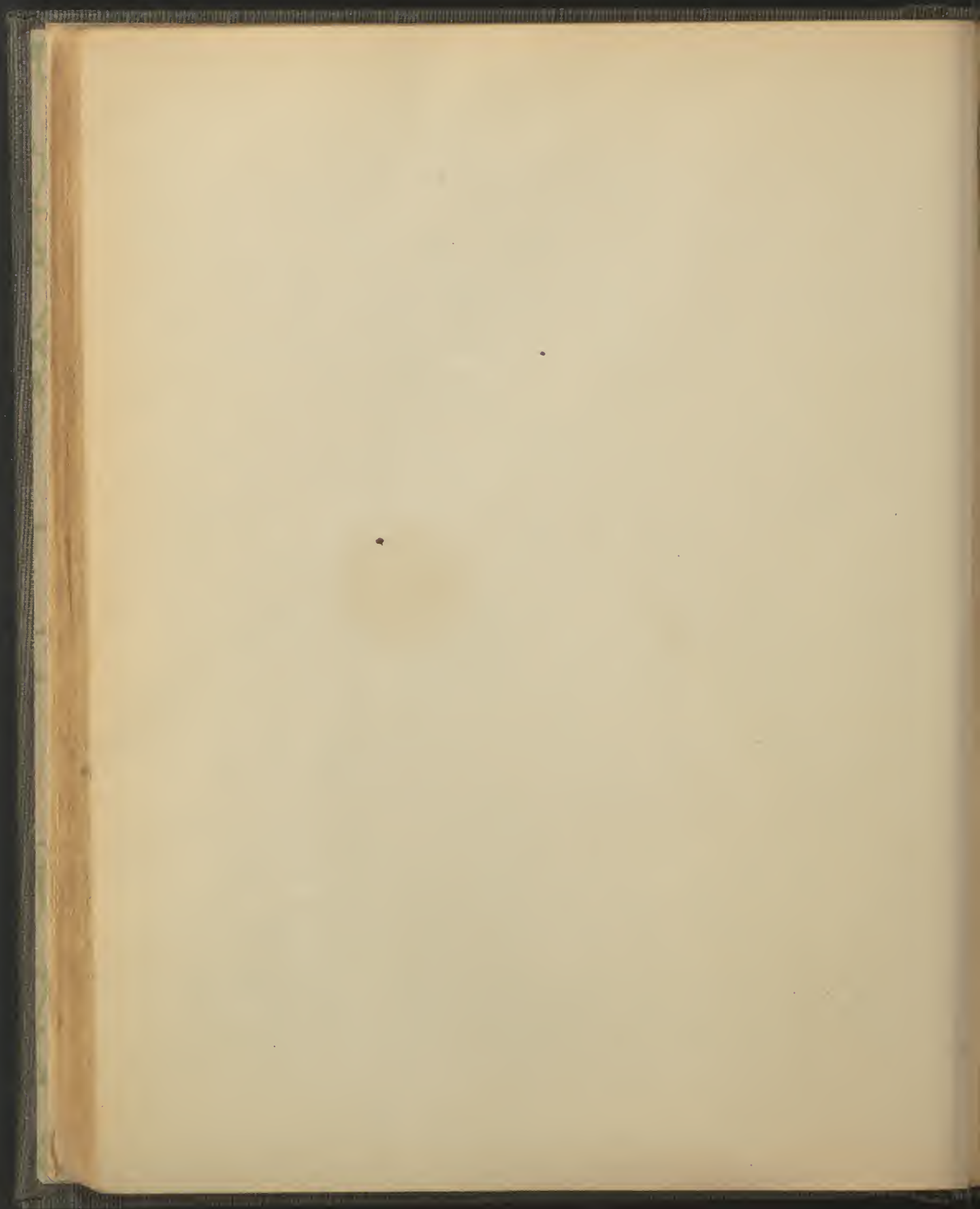
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See what my says -



The largest part or extent of the Abdomen is on a
line with the umbilicus

59
of reference the abdomen is arbitrarily subdivided into three
zones and each of these into three regions by two horizontal
transverse and two vertical imaginary lines. The upper
horizontal line is drawn between the extremities of the
tenth ribs; the lower between the two anterior superior
spinous processes of the ilia. The vertical lines are pro-
jected upward from the centre of the fold of the groin,
one on each side. The names by which the nine regions,
thus formed are known, are as follows; the central region
in the upper zone is the epigastrium the one on either side
hypochondriac, right or left, the central region in the mid-
dle zone is the umbilical the lateral ones, lumbar, right
or left, the central region in the lower zone is the Hypo-
gastrium, the lateral ones Iliac or Inguinal, right or left.
The contents of the abdomen are, the greater portion of the
alimentary canal, the accessory organs of digestion, the
liver, spleen, pancreas, and the genito-urinary organs,
the kidneys and supra-renal capsules, the bladder
and its appendages, the prostate glands, seminal ves-
icles, vas deferens; the testicles are considered with the
abdominal viscera although, in the adult, lying out-
side of the cavity, in the scrotum: in the female are
the uterus and its appendages and the vagina: en-
veloping most of these organs and lining the interior
of the cavity is a serous membrane, the peritoneum -
The portions of the alimentary canal in the abdomen
are 1st, the stomach, 2^d the small intestine, 3^d the
large intestine. The stomach is the dilated part which
succeeds the oesophagus and is about twelve inches
long. It terminates about the line that separates the
epigastric from the right hypochondriac region, in
the small intestine. The small intestine is divided



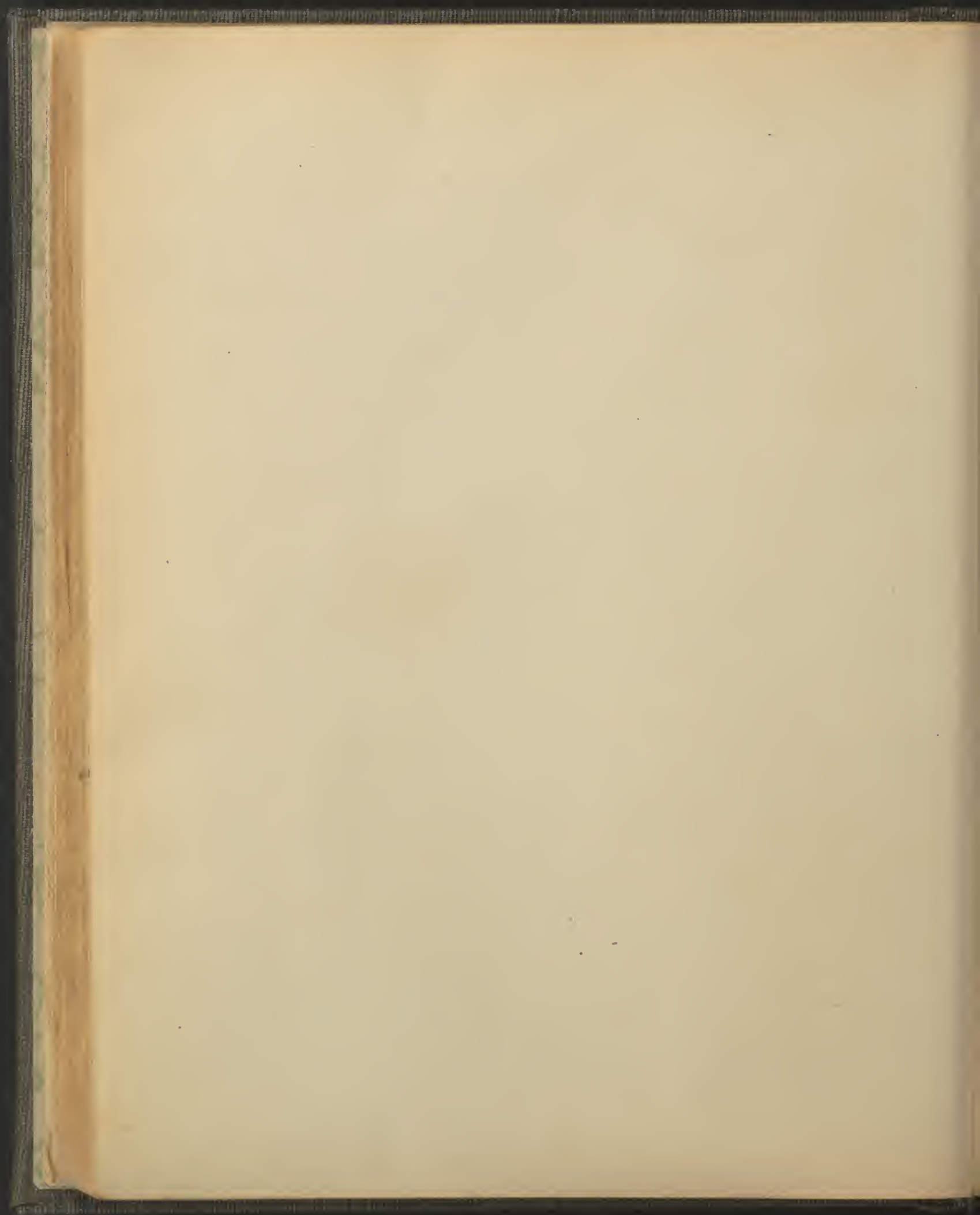
into three parts, the duodenum, the jejunum and the ileum. The duodenum is about nine inches long; the jejunum and ileum together are some twenty feet long, the jejunum comprising the upper two fifths and the ileum the lower three fifths. The duodenum is again subdivided into three portions, the 1st portion is called the ascending or oblique duodenum, is about two inches long and terminates at the under surface of the liver, at the neck of the gall bladder in the right hypochondriac region, in the 2nd portion, called the descending or perpendicular duodenum, which passes vertically downward for about three inches into the right lumbar region and about on a level with the upper border of the fourth lumbar vertebra terminates in the 3^d portion, the transverse duodenum, which is rather more than 3 inches long and crossing the front of the vertebral column obliquely upward terminates at the left side of the body of the second lumbar vertebra in the jejunum. The large intestine is subdivided into three portions called, caecum, colon, rectum. The caecum is the commencing two and a half inches, lies in the right iliac fossa and terminates in the colon at the entrance of the small intestine. The colon is divided into four parts, ascending, transverse, descending, sigmoid. The ascending colon passes upward through the right lumbar region into the right hypochondriac region at the under surface of the liver it curves sharply to the left, forming the hepatic flexure of the colon and becomes the transverse colon. The transverse colon passes downward and to the left, crosses the abdomen between the epigastric and umbilical regions and rising into the left hypo-



chondriac region, it forms another abrupt curve at the lower end of the spleen, called the splenic flexure of the colon, and becomes the descending colon: the descending colon passes downward through the left lumbar region into the left iliac fossa, where it becomes the sigmoid flexure of the colon: the sigmoid flexure is formed by the gut passing upward and to the right and then downward and to the left to terminate at the base of the pelvis on the left side in front of the left sacro-iliac symphysis by becoming the rectum: the length of the colon is about four feet: the rectum is the last eight inches of the large intestine and terminates the alimentary canal at the anus about the middle of the floor of the pelvis. The liver lies in the upper zone of the abdomen, stretching nearly across the cavity just beneath the roof. The spleen is in the left hypochondriac region. The pancreas lies transversely behind the stomach, between the spleen and perpendicular duodenum, crossing the front of the body of the 1st lumbar vertebra. Each of the two kidneys is beside the lumbar portion of the spinal column on the front of the posterior abdominal wall. The urinary bladder and its appendages are found in the pelvis just behind the pubes. The uterus and vagina, in the female are interposed between the bladder and the rectum.

- The Reflections of the Peritoneum -

The peritoneum being a serous membrane is a closed sac, one layer covering the viscera and called the visceral layer and another lining the wall of the abdomen and called the parietal layer. The existence peritoneum renders the motions of the viscera



upon each other and on the abdominal walls easy and harmless and furnishes bonds of connection between different viscera and between them and the wall of the containing cavity. Treating a closed bag, its continuity can be demonstrated by the fact that in following it vertically or transversely it leads back to the point of departure. The folds it makes from above downward are the more important and they will first be stated. It leaves the under surface of the diaphragm in two layers which pass to the upper and lower edge of the posterior border of the liver, the upper layer covers the upper surface of the liver, curves around the anterior border and coats the lower surface as far back as the transverse fissure, where it meets the lower layer, which has covered the lower surface from the posterior border to the transverse fissure: the two layers having thus enveloped the liver leave it at last the transverse fissure and pass downward to the stomach, forming between these two organs the gastro-hepatic or lesser omentum: they then in the stomach at its upper border and one passing over the front and the other over the back of the stomach, they again meet at the lower border having furnished a coat to the stomach: the two layers leaving the stomach at its lower border pass downward in front of the transverse colon without adhering to it and descend almost to the firm of the pelvis just behind the anterior abdominal wall, they then reverse their course running upward just posterior to their descending course they reach the transverse colon and separating enclose it, that part of the peritoneum thus extended between the lower border of the



stomach and the transverse colon is called the great-
 er gastro-colic omentum: the two layers having en-
 veloped the transverse colon meet at its posterior
 border and pass backward to the posterior wall of the
 abdomen, thus forming the transverse meso-colon,
 which loosely holds the transverse colon to the posterior
 abdominal wall. The two layers now finally separate,
 one goes up the front of the posterior abdominal wall
 to the under surface of the diaphragm, when its
 course was first taken up, thus partially enclosing
 a space behind the stomach called the lesser cavity
 of the peritoneum and which communicates with
 the general cavity of the peritoneum by an opening
 behind the slight duodenum, called the foramen of
 Winslow. The other layer of the transverse meso-colon
 passes forward to envelop the coils of the jejunum
 and ileum and returns to the posterior abdominal
 wall forming thus a double layered membrane
 holding these convolutions to the parietes and called
 the mesentery, whose attachment may be thus given,
 from the left side of the body of the 2^d lumbar vertebra
downward and to the right, to the right sacro-iliac sym-
physis: after forming the mesentery the peritoneum
 descends the posterior abdominal wall, crosses the
 brim of pelvis, passes down its posterior wall, covering
 the upper half of the rectum completely leaves the
 front of the rectum an inch below its middle, strikes
 the back part of the base of the bladder, in the male,
 covers the back and sides and posterior half of the top
 of the bladder and leaves the bladder to mount the
 posterior face of the anterior abdominal wall and
 then reach its starting point on the under surface of

Fraser of Humber -
See volume of 1864 page -
" lesser cord of Portmouthe -

the diaphragm. In the female when the peritoneum leaves the front of the rectum it passes to the posterior wall of the vagina covers its upper arch then the back of the uterus, turns down the front of the uterus and thus reaches the back of the bladder.

In mounting over the top of the uterus it also passes over the ovary and its ligament on each side thus forming on each side a double-layered fold stretched between the side of the uterus and the lateral wall of the pelvis, called the broad ligament of the uterus; between its layers are the ovary and its ligament, the round ligament of the uterus and the Fallopian tube.

Followed transversely around the abdomen, about its middle, the peritoneum presents the following folds - commencing on the anterior abdominal wall it can be followed to the posterior abdominal wall, here it reaches the descending colon and passes over its front covering it from half to three fourths around and leaving it at a corresponding line on the inner side reaches the vertebral column when it turns forward to envelop the jejunum and ileum and passes back on itself to the vertebral column forming the mesentery; it then runs out on the posterior abdominal wall to the ascending colon passes over the front of it covering it from half to three fourths around and leaving it reaches the abdominal wall again along which it runs to the place of departure.

Relations of the Abdominal Viscera -

Relations of the Stomach -

The stomach lies in the upper zone in the left hypochondriac and the epigastric regions, generally the

(12) at the end of the 8th rib. ⁹⁵—

Relations of the Stomach

above

<u>Left</u>	{	Diaphragm	{	<u>Right</u>
Spleen		left lobe of liver		duodenum

below.

Trans Colon

Behind
Pancreas
Left Kidney

in front.
Ant abdominal
wall.

Spleen lies
in left side of abdomen

terminating in the duodenum on the line that separates the Epigastric from the right hypochondriac region, but occasionally passing more or less into the latter - Its long axis is directed from above downward, from left to right and from behind forward: one surface looks forward the other backward: one border, the shorter, or lesser curvature looks upward, the other, the greater curvature is below: the larger end is to the left, the smaller end to the right. It is continuous with the oesophagus about three inches to the right of the left end, at the left end of the lesser curvature: it is continuous with the duodenum at the right end. Its upper border is held to the under surface of the liver by the lesser omentum: its lower border is indirectly held to the transverse colon by the great omentum: its left end is connected to the inner face of the spleen by the gastro-splenic omentum - Above it is the diaphragm and the left lobe of the liver: below it is the transverse colon: to the right it is continuous with the duodenum: to the left is the spleen: behind are the pancreas and left kidney: in front the anterior abdominal wall and part of the left lobe of the liver. It has a complete peritoneal coat.

- Relations of Oblique Duodenum = $2\frac{1}{2}$ in

The oblique, or ascending duodenum commences at the right extremity of the stomach, usually on the line that separates the epigastric from the right hypochondriac region and passes upward and to the right, in the right hypochondriac region, to terminate in the descending duodenum at the under surface of the liver, at the neck of the gall-bladder. It lies in the right border of the lesser omentum and has behind

The Duodenum

Oblique { behind the hepatic artery
common bile duct } in fold of
Portal vein
in front The liver

Perpendicular { Behind the right Kidney
in front the ascending colon }
to the left is adherent to the
head of the pancreas.

Transverse { above - the lower border of the
pancreas separated by the
Sup. mesenteric artery and vein
in front is the transverse
colon
in front Partially by Peritoneum
behind - is aorta.

lies entirely in Peritoneum. 66
of the hepatic artery, the common bile duct and the
portal vein, and in front the liver. It is completely
covered by peritoneum.

Relations of Perpendicular Duodenum.
The perpendicular, or descending duodenum com-
mences at the termination of the oblique duodenum
in the right hypochondriac region, at the neck of the
gall-bladder and descends vertically into the right
lumbar region to terminate by becoming the trans-
verse duodenum about on a level with the upper bor-
der of the fourth lumbar vertebra. It lies behind the
peritoneum, being covered by it only partially in
front. Behind, it has the right kidney and in
front, the ascending colon: to its left it is adherent to
the head of the pancreas. descending duodenum.

Relations of Transverse Duodenum. 3 in 4
The transverse duodenum commences where the
descending terminates, in the right lumbar region,
on a level with the upper border of the body of the
fourth lumbar vertebra, and passing upward to the
left across the vertebral column, the body of the
third lumbar vertebra terminates in the jejunum
at the left side of the body of the second lumbar verte-
bra. It lies behind the peritoneum, between the diverg-
ing layers of the transverse meso-colon, so that it is
covered by it only in front. Above it is the lower border
of the pancreas, from which it is separated by the
superior mesenteric artery and vein: in front is
the transverse colon.

Relations of Jejunum and Ileum.
The remaining twenty feet of the small intestine,
after the duodenum, are thrown in coils called the

W	W	W
J	W	W
J	W	J

convolutions of the small intestine, and are found chiefly in the umbilical and hypogastric regions, falling off however into the surrounding regions, some being always found in the pelvis, between the rectum and bladder, in the male, and between the rectum and uterus, in the female. The jejunum comprises the upper two fifths of the convolutions and commences where the duodenum terminates, at the left side of the body of the second lumbar vertebra: the ileum is the lower three fifths of the convolutions and terminates in the right iliac region by opening into the large intestine, two and a half inches above its commencement.

These convolutions are completely enveloped by the peritoneum, which holds them by a double layered fold, the mesentery, to the posterior abdominal wall. In front they are separated from the anterior abdominal wall, by the great omentum: above is the transverse colon: to the right is the ascending colon: to the left is the descending colon.

Relations of Cecum. = caecum coli cecum.

The cecum is the commencement of the large intestine: it is some two and a half inches long and terminates in the colon at the opening of the small intestine. It lies in the right iliac fossa, or region, and is generally completely invested by peritoneum. Attached to it is the vermiform appendix, a blind tube about the size of a goose quill and from four to six inches long.

The appendix opens into the inner back of the cecum, just below the opening of the ileum, and not into the bottom. The appendix has a complete peri-

Ascending colon

In front abdominal wall
out side " " "
over " the small intestine
Behind is L duodenum and
right kidney

Transverse Colon.

In front the great omentum
Behind the transverse duodenum
Above the Stom. liver, spleen &
Below are the convolutions of
the small intestine

Duodenum colon
over

small coat and lies slightly coiled on the inner side of the cecum and just below the terminal portion of the ileum.

- Relations of Ascending Colon -

The ascending colon commences where the cecum terminates, in the right iliac region, at the opening for the ileum and passes upward through the right lumbar region into the right hypochondriac to terminate by becoming the transverse colon at the hepatic flexure of the colon at the under surface of the right lobe of the liver, to which it is held by a fold of the peritoneum, being covered by it in front from half to three fourths around. In front and to the outer side is the abdominal wall; to the inner side the convolutions of the small intestine; behind are the perpendicular duodenum and right kidney.

- Relations of Transverse Colon -

The transverse colon commences at the termination of the ascending colon, at the hepatic flexure of the colon, in the right hypochondriac region, at the under surface of the liver. It passes slightly downward to the left across the abdomen between the upper and middle zones and rising onto the left hypochondriac region terminates by forming the splenic flexure of the colon at the lower end of the spleen and becomes the descending colon. Its course is curved with the convexity downward and forward. It is entirely covered by peritoneum which holds it by a long double layered fold, the transverse mesocolon to the posterior abdominal wall and by a small band to the lower end of the spleen; it is indirectly held to the greater curvature of the stomach by the great omentum.

Descending Colon

To front & outer Side - abdominal wall

Behind - Kidney (left)

inner Side convolutions of Small intestine

Sigmoid Flexure

15

turn.

In front it is separated from the anterior abdominal wall by the great omentum. Behind is the transverse duodenum; above are the liver, stomach, and spleen; below are the convolutions of the small intestine.

- Relations of Descending Colon -

The descending colon begins where the transverse colon ceases, in the left hypochondriac region at the lower end of the spleen and passing downward through the left lumbar region terminates in the left iliac region in the sigmoid flexure of the colon. It lies behind the peritoneum, being covered by it in front, from half to three fourths around. To its front and outer side is the abdominal wall; behind is the left kidney; to its inner side are the convolutions of the small intestine.

- Relations of Sigmoid Flexure -

The sigmoid flexure of the colon begins at the termination of the descending colon in the left iliac fossa and curves upward and to the right and then downward and to the left to become the rectum at the firm of the pelvis in front of the left sacro-iliac synchysis. It is completely invested by the peritoneum, which holds it to the left iliac fossa by a long fold, which permits it to fall in different directions.

- Relations of Rectum -

The rectum commences at the termination of the colon at the firm of the pelvis on the left side in front of the left sacro-iliac synchysis and passes first downward and to the right to the

Relations of pericardium
to enlarged spleen

1st - upper livers (relations)
" " Spleen
" " Pancreas
" " Kidneys (relations)
" " Pectoralis major
" " " minor
" " Subclavius

1st portion of the rectum is 4 in long
2nd " " " 3 " "
3rd " " " 1-1/2 " "

Relations of Rectum

In front	Behind
Bladder	Piriformis muscle
its appendages	Sacral plexus
	left int. iliac
Convolution of small intestines	

N.B. 2nd part of rectum, commences 3" ^{below in front} sacro rectal junction.
Curved in front for its upper 1 in. with (P) and
Sep. from the bladder by small vessels. At its lower
end the 1st in the rectum catches the base of bladder
on each side the 2nd to base the
sem. vesicles & ureters.

On each side is two ureter
3rd part begins from the 2nd to 3rd - its course
is upward & forward. - back on a horizontal line

and is seen from the right side of
the penis

70
...middle of the front of the sacrum, then down the
front of the sacrum to a point opposite the line of
the coccyx, when it turns slightly backwards and after
a course of about an inch ends at the anus. For its
upper half it is entirely covered by the peritoneum,
which holds it to the pelvic wall; for its lower half
is covered by the peritoneum only its front for about
an inch at its upper part; in other words it is
three inches from the anus to the peritoneum in
front and four inches behind, so that the peritone-
um comes an inch farther down on the front of the
rectum than it does on its posterior aspect.

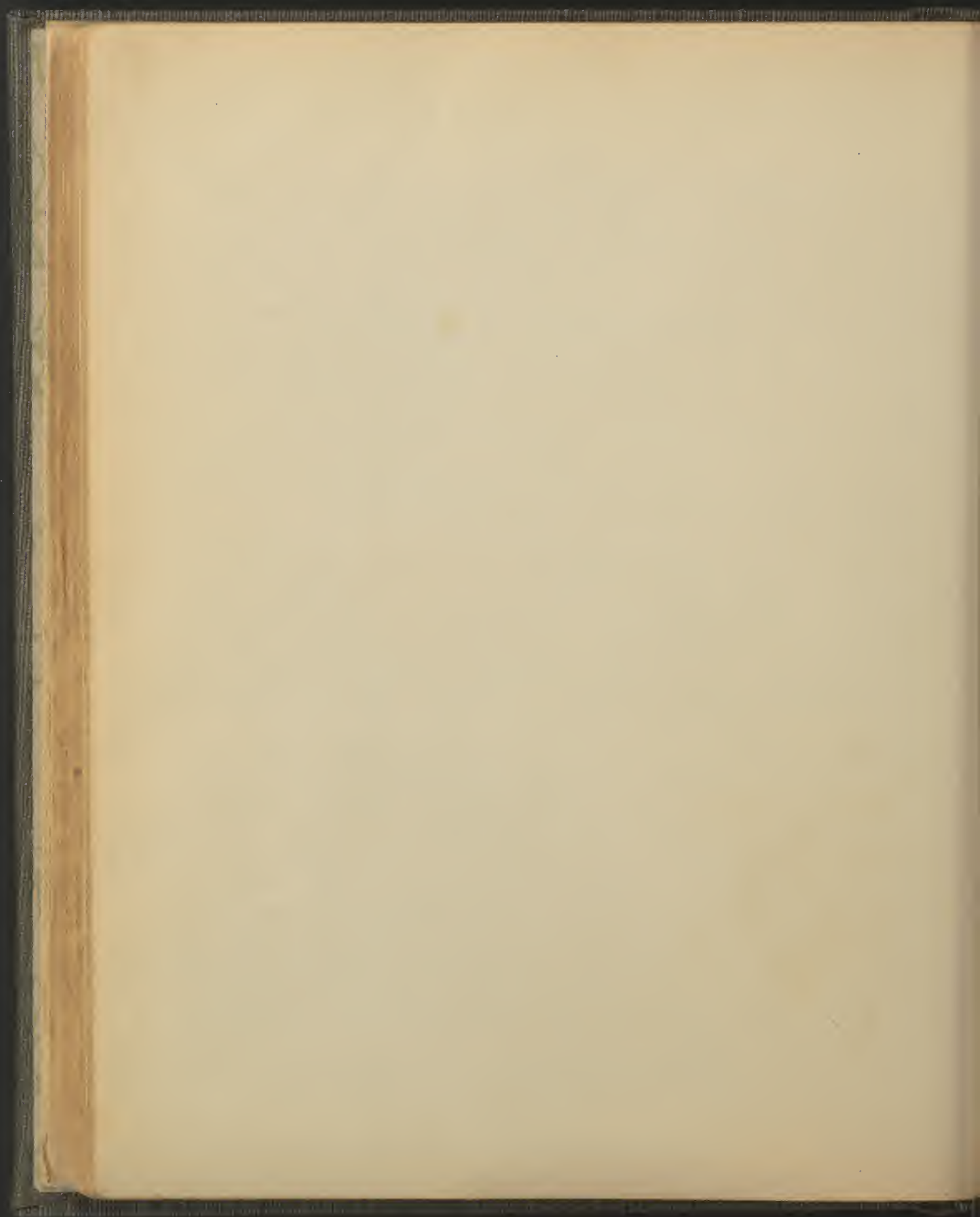
It has behind it the hypogastric vessels, the co-
cyl plexus of nerves and the left internal iliac
vessels: in front, from above and downward in the
male are the bladder and the appendages of the blad-
der, in the female the uterus and vagina: interpo-
sed between it and the bladder or uterus are some
convolutions of the small intestine. The meso rectum
the allium to sacrum.

Relations of the Liver

The liver is found in the upper zone of the abdomen,
the greater part being in the right hypochondriac
and epigastric regions, but it projects to a greater
or less extent into the left hypochondriac region.

Its long axis is transverse: its sharp notched bor-
der is in front and below, nearly corresponding to the
lower margin of the ribs; its thick border is back-
ward resting against the diaphragm, grooved for the
inferior vena cava and also nearer the left end for
the oesophagus: its convex surface is above: its larger
end is to the right.

It is held in place by its five ligaments and is



connected to the lesser curvature of the stomach, by
the lesser or gastro-hepatic omentum. Of its folds
ligaments form are formed, by the peritoneum, the
first is called the round ligament and is the ob-
literated umbilical vein. The peritoneum reaches
the liver from the diaphragm by two very short lay-
ers, which enclose the one the upper edge, the other, the
lower edges of the posterior border; these layers are
separated by a considerable, somewhat triangular,
space on the posterior border but at each end of the
border come together and here form a two lateral
ligaments, right and left of the liver.

Between these lateral ligaments the layers sur-
rounding the interspace on the posterior border form
what is called the coronary ligament: the upper lay-
er is directed forward from the posterior border, at a
point about one third of the length of the liver from
its left end, across the upper surface of the liver so
as to pass around the round ligament and thus
form a double layered fold called the suspensory
or longitudinal ligament, holding the liver below,
to the diaphragm, above. The round ligament is
that part of the obliterated umbilical vein which
passes backward from the anterior abdominal wall
to the notch in the anterior border of the liver, lying
between the two layers of the longitudinal ligament.
The peritoneum reaching the liver in the manner
described passes over it, one layer over the upper
surface, around the anterior border, backward on the
under surface to the ligamentous fissures, where it meets
the other layer, which has run forward on the lower
surface from the posterior border; thus furnishing an

Abn.-
Diaph.
Lira ?

Arctural
Pannus
Lira -

Rebus
Lira
rich scap.

Est -
7-0-1 lbs.

Belon
Coln.
Flexus

In gut
cut at will.

a most complete serous coat for the organ.

Above the liver is the diaphragm: below it are, from right to left, the right kidney, with its supra-renal capsule; in front of these the hepatic flexure of the colon, behind and to the left of this the oblique duodenum, then the stomach and lastly the upper end of the spleen, which is only an occasional relation.

- Relations of the Spleen -

The spleen is confined to the left hypochondriac region; its long diameter is vertical; its thin noted border is anterior: its smaller end is below: its convex surface is external. It has a complete peritoneal coat and is held in position by folds of peritoneum: one fold passes from its upper end to the diaphragm and is called the suspensory ligament: another passes from the inner face to the great end of the stomach and is called the gastro-splenic omentum.

A third small fold extends from the lower end to the splenic flexure of the colon.

Above it is the diaphragm, from which it is sometimes separated by the liver: below it is the splenic flexure of the colon: behind its lower end is the left kidney and its capsule: in front is the anterior abdominal wall: internal to it are the great end of the stomach and the tail of the pancreas: externally it corresponds to the seventh, eighth and eleventh ribs, from which it is separated by the diaphragm, the left pleura and the lower border of the left lung.

- Relations of the Pancreas -

Cross body 2nd lumbar
interna.

Relations of Pancreas Behind.

Behind the abdominal aorta & spleen
collapsus suis

behind the head is the common duct
also on head of pancreas -
Sub-mucosal artery.

along The splenic artery & vein

left Spleen

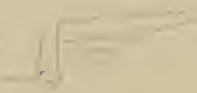
Relations of pancreas

The pancreas extends from the inner face of the spleen on the left to the descending duodenum on the right: its long diameter is therefore transverse: its longer end is to the right: one surface looks forward and the other backward: one border is above the other below.

It lies on the front of the posterior wall of the abdomen, crossing the body of the first lumbar vertebra. It is behind the peritoneum, which covers it only in front. To its right is the perpendicular duodenum, to which it is closely adherent: to the left is the inner face of the spleen, to which its tail is held by the peritoneum: in front is the stomach: behind its left end is the left kidney: below it is the transverse duodenum, from which it is separated by the passage of the superior mesenteric artery and its vein. The relations of the pancreas to blood vessels are very complex and may be given as follows.

It is separated from the vertebral column by the abdominal aorta which produces the coeliac axis just on a level with the upper border of the head of the pancreas, while the superior mesenteric artery is emitted just behind the head. The latter descends behind the pancreas to anastomose between its lower border and the transverse duodenum.

The coeliac axis rests on the upper border of the head of the pancreas and there divides into three branches one of which, the splenic artery, pursues a very oblique course along the upper border to the inner face of the spleen. The splenic artery is accompanied by its vein, which passes to the right

The right hand is the lower 

from the spleen, lying in a deep groove on the superior face of the pancreas just below its upper border behind the head of the pancreas the splenic vein unites with the superior mesenteric vein, which ascends behind the head of the pancreas as the companion of the artery, the two veins forming here the portal vein. About the middle of its course the splenic vein receives the inferior mesenteric vein which branches behind the body of the pancreas. Surrounding the coeliac axis are the two cervical ganglia of the sympathetic giving off the numerous branches of the solar plexus of nerves, which are in close relation to the head of the pancreas.

— Relations of the Kidneys—

The kidneys lie on the front of the posterior abdominal wall, extending from about the eleventh rib downward and slightly outward to near the crest of the ilium. The right kidney is perhaps a little lower than the left, beginning opposite the lower border of the eleventh rib; the left opposite the upper border of the eleventh rib. The kidney corresponds to the last dorsal and the first lumbar vertebra. It is behind the peritoneum embedded in a considerable mass of loose connective tissue, which usually contains much fat; the peritoneum is loosely connected to the front of the organ by this tissue, and can easily be slipped off. The long diameter of the kidney is from above downward and slightly outward; one face looks forward and slightly outward, the other backward and slightly inward, the superior

Pa 78

Taken all as the Pecten
 (Then not across Sarsaparilla (to) connection between
 then

1st 2nd 3rd

III The Pecten facing 2nd ribbed this Pecten facing long adjacent
 to the Pecten. Since the process to Pecten process

IV Lir. Anni

V A Leg pubes.

VI Pect. of penis.



Pecten facia.

and is perhaps the larger: the outer is the convex border, the inner is the concave border.

The kidney rests on the quadratus lumborum through most of its extent, its base is on it on the anterior lamella of the posterior aponeurosis of the transversalis abdominalis muscle. Along its inner edge it lies on the psoas major muscle and behind its upper part is the diaphragm, which separates it from the pleura, the diaphragm here frequently presenting a fissure of considerable size where the muscle tissue is wanting, so that in this event, all that separates the kidney from the pleura is a little loose connective tissue. Each kidney has upon its upper inner front part the suprarenal capsule or gland. The outer is the outer edge of the

The outer border is nearly opposite the outer edge of the erector spinal muscle and about corresponds to the junction of the posterior fourth with the anterior three fourths of the crest of the ilium.

The right kidney has in front the descending duodenum and in front of that the ascending colon; along its inner border is the inferior vena cava; its upper end is in contact with the lower surface of the liver, which may also rest on the front of its upper part. The left kidney has on its front the descending colon and at its upper part the lower end of the spleen, the tail of the pancreas and the great end of the stomach.

Relative of the Bladder, in the male.

The urinary bladder occupies the front portion of the pelvic cavity, being confined to it when empty, or even nearly so, but rising out of it in proportion to its state of distension; occasionally reaching the level of the umbilicus.

The answer of the blood is more nearly
horizontal than 1 degree

bladder. It lies just behind the symphysis pubis with its long diameter from above downward and backward, extending from the upper border of the symphysis pubis or from some point in the linea alba between it and the umbilicus, varying with distension downward and backward and if prolonged would strike the lower part of the front of the sacrum.

The larger end of the bladder is below and looks downward and backward. The bladder is retained in position chiefly by its ligaments, which are ten in number: five of these being called the false ligaments and furnished by the peritoneum four formed by processes of fascia and one being the remnant of a foetal structure, the bladder; these last five are called the true ligaments.

The peritoneum leaves the front of the rectum about three inches above the anus and sweeps across a deepening, comes to the back part of the base of the bladder, then broad fold extending from the front of the rectum, to the bladder is called the two posterior false ligaments, although the division between them is arbitrary. Being the middle line of the body; however on each side the fold presents an antero-posterior ridge, produced by the passage of the hypogastric artery from the posterior pelvic wall to the side of the lower part of the bladder, the artery then passes up the side of the back of the bladder to the side of its top, then leaps to the anterior abdominal wall and approaching its fellow makes for the umbilicus; in the foetus this artery carries impure blood from the foetus to the placenta emerging at the umbilicus; after birth it becomes impervious from the umbili-

2 post. false ligaments.
 1 sup. " " "
 2 lateral " " "

The nucleus forms the sup. line lig.
 2 ant. true lig.
 2 lateral true lig.



92-13-75

can as far as the top of the bladder, but from that point back to its origin from the internal iliac artery, it transmits during life some blood to the bladder.

The peritoneum reaching the bladder covers the back part of its base, the back of the bladder, the posterior half of each side and the posterior half of the top, and then passes to the anterior abdominal wall, to which it is guided by the urachus and the two obliterated hypogastric arteries. That part of the peritoneum extending from the middle of the top of the bladder to the anterior abdominal wall is called the superior false ligament and that part on each side extending from the side of the bladder to the lateral wall of the pelvis, forms the lateral false ligament.

The urachus in the adult is an inconspicuous fibrous band extending from the top of the bladder to the umbilicus along the linea alba and is called the superior true ligament of the bladder.

The four remaining true ligaments are formed by the pelvic fascia which lines the cavity of the pelvis just beneath the peritoneum. From either side of the symphysis pubis a process from this fascia is extended to the lower part of the front of the bladder and prostate gland, these two being called the two anterior true ligaments of the bladder. From the lateral wall of the pelvis on each side a process of fascia passes to the side of the bladder; the two being known as the two lateral true ligaments of the bladder.

The front of the bladder is separated from the back of the symphysis pubis only by a little loose connective tissue. The neck of the bladder is received into the back part of the prostate gland and is continuous

see p 74

Levator Ani

Anus ^{1st} in front from the post surf. of the body and ramus of the pubes on the outer side of symph.

Post to anuses from the inner surface of the spine of the ischium and from the obturator foramen

Insertion

into coccyx ^{to tip.} post and ant enter back to form the floor of the pelvis?

attaches to side of bladder & post. gland.

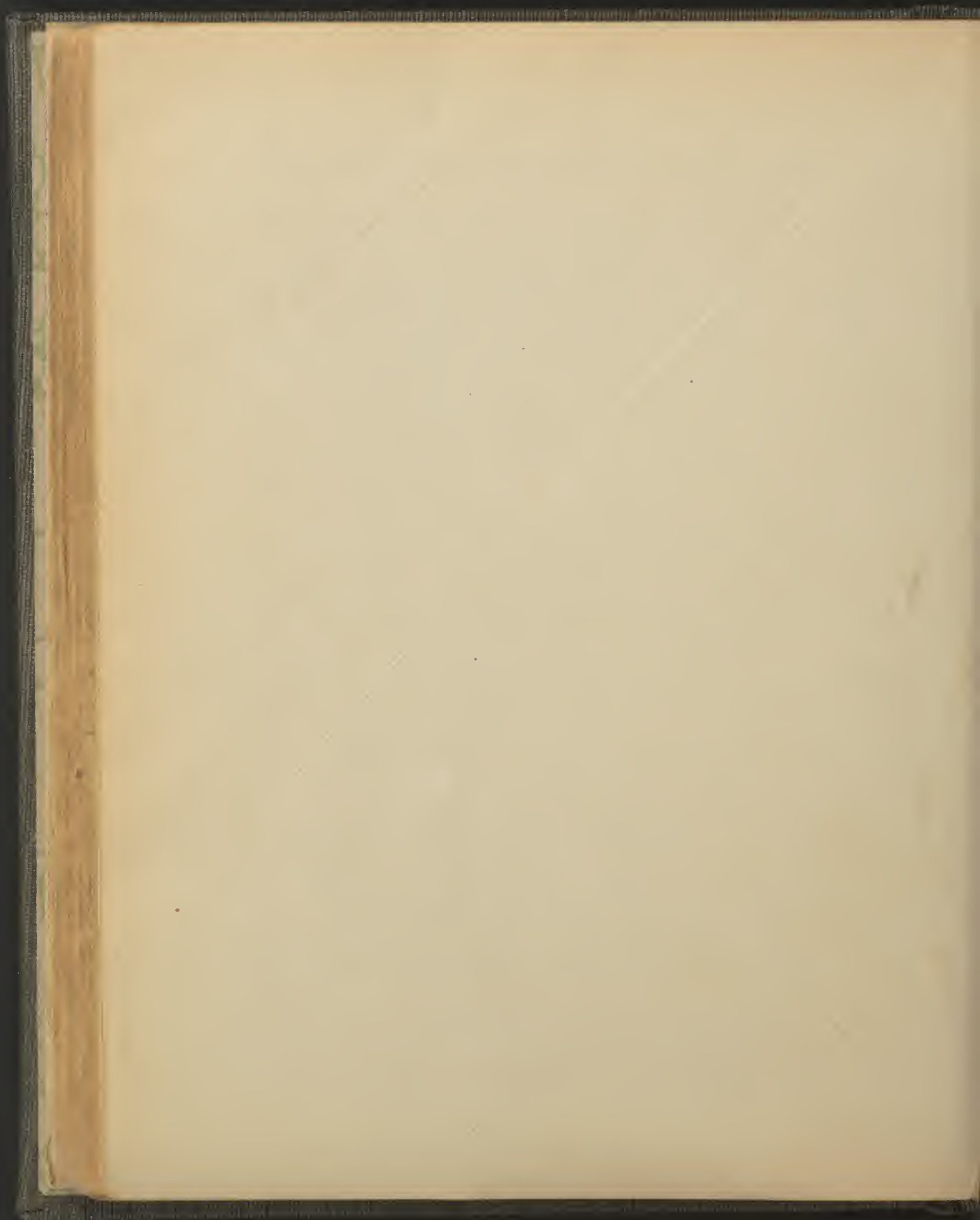
The x. ani becoming the coccygeus mus which and the compressor urethra?

(9) Insertion into the perineal body and the bulb of the urethra

with the urethra, being about an inch behind and below the pubic arch.

The posterior face of the bladder is separated from the front of the rectum usually by some convolutions of the small intestine. The base of the bladder rests on the front of that part of the rectum which is found descending the front of the sacrum, usually called the second portion of the rectum. Piercing the posterior part of the base of the bladder on each side is the ureter, the two being about two inches apart, each having just internal to the vas deferens, which, entering the abdomen at the internal abdominal ring passes to the side of the top of the bladder, descends to its posterior face and runs forward and inward along its base to terminate at the front part of the base by uniting with the duct, which forms the seminal vesicle, to produce the ejaculatory duct. The seminal vesicle lies, one on each side, on the side of the base of the bladder; pear-shaped, its base is behind and its smaller end forward and inward at the back of the prostate gland.

In the female the bladder, in general terms occupies the same position as in the male. There are no prostate gland, no vas deferens, and no seminal vesicle. The base of the female bladder rests on the upper part of the anterior wall of the vagina, and on the lower part of the front of the uterus, which two separate it from the front of the rectum. Otherwise its relations are about the same as in the male.



- The Stomach -

In shape the stomach is a curved cone with one side shorter than the other and with the other two sides somewhat flattened (and called its anterior and posterior faces: the short or, as it is called, border, is a-fore and is known as the lesser curvature: the longer is below and is called the greater curvature. The large end of the cone is to the left and is called the splenic end because it is hugged by the spleen; some two or three inches from this end and at the left extremity of the lesser curvature is the aperture of the oesophagus which is called the cardiac orifice and the splenic end or cul de sac of the stomach is the dilated portion belonging to the left - and this -

Passing to the right extremity of the stomach it is found to be much smaller than the splenic and is called the pyloric extremity, because the exit from the stomach here into the duodenum is known as the pylorus and is the smallest part of the alimentary canal being about one half of an inch in diameter - In position the stomach is not directly transverse but is somewhat oblique its long diameter is from above downward forward and to the right: i.e. the cardiac orifice is on a higher level and farther back than the pyloric. When empty, the anterior face of the stomach looks forward almost directly forward and the posterior face almost directly backward but when distended the stomach rotates on its long axis so that its anterior face looks upward, its posterior face downward and its greater curvature becomes anterior -

In size the stomach is about twelve inches in its

Duodenum

- 1st part the ascending, is about 2 in long
2nd part " descending 3 in long
3rd " " transverse 4 in long

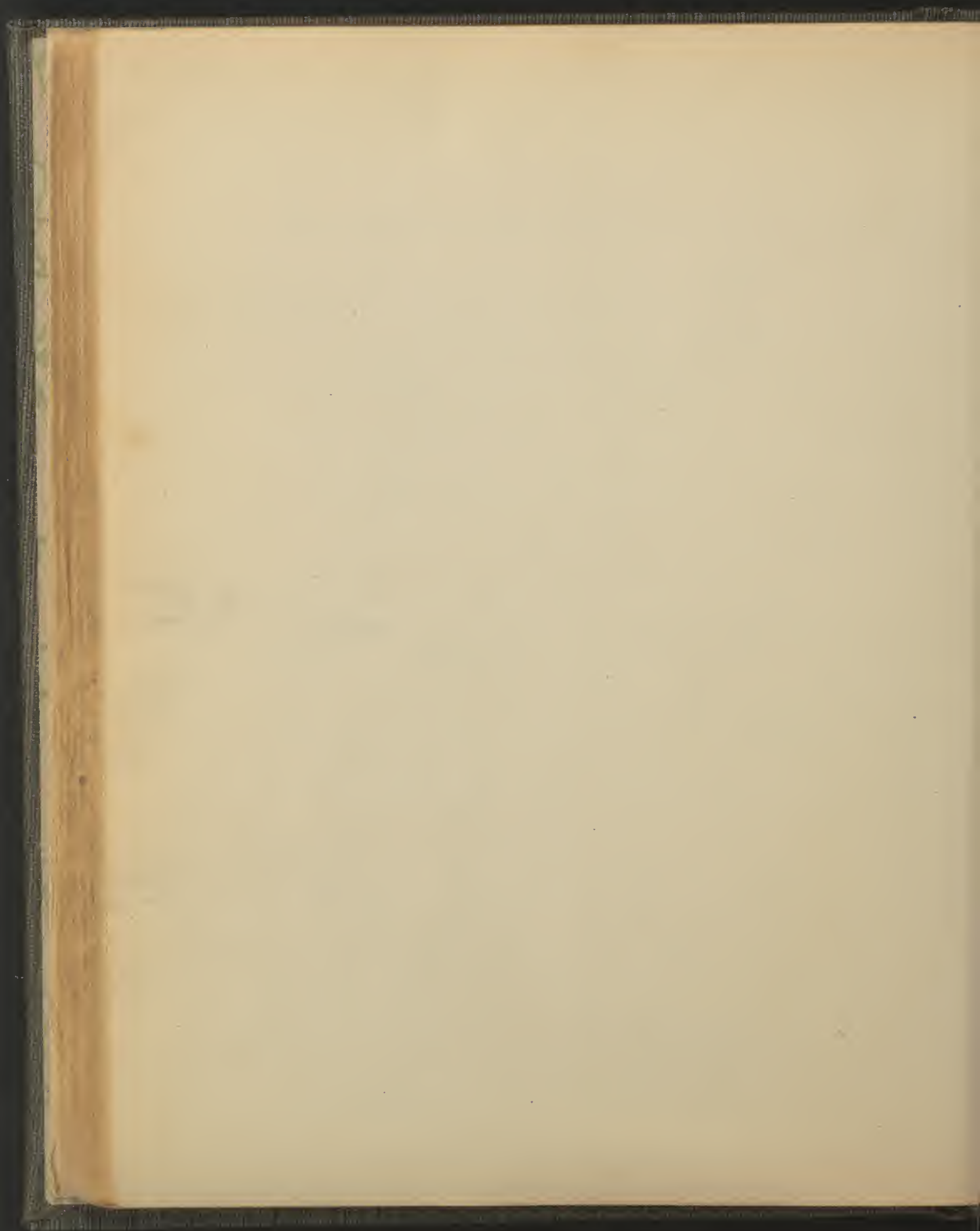
The duodenum terminates at body of 1st lumbar vertebra on (left side).

lower $\frac{3}{5}$ of small intestine is the ileum

of a diameter and receives from a quart to two quarts of food at a time.

- The Duodenum -

The duodenum succeeds the stomach and is some six or seven inches in length, forming in its course three shoe-shaped curves, the convexity of the curve being to the right. It is divided into three portions, beginning at the pyloric orifice of the stomach, the first two inches, about, called the oblique portion, pass upward to the right and backward; then the next three inches, about, pass downward, and this portion is called the perpendicular and lastly the longest and narrowest portion of the gut is called the transverse and extends from the termination of the perpendicular portion, to the left to cross the vertebral column and terminate in the jejunum or the second portion of the small intestine the duodenum being the first portion and the last portion being the ileum. The point where the duodenum terminates is well defined as being at the left side of the second lumbar vertebra, but the subdivision of the remainder of the small intestine is arbitrary and ill-defined. The jejunum is the second portion of the small intestine, commencing where the duodenum terminates i. e. at the left side of the second lumbar vertebra it comprises the upper two-fifths of the remainder of the small intestine which is about twenty feet in length the lower three-fifths, about, of these twenty feet being called the ileum which terminates in a suddenly dilated portion of the canal called the large intestine. The jejunum and ileum

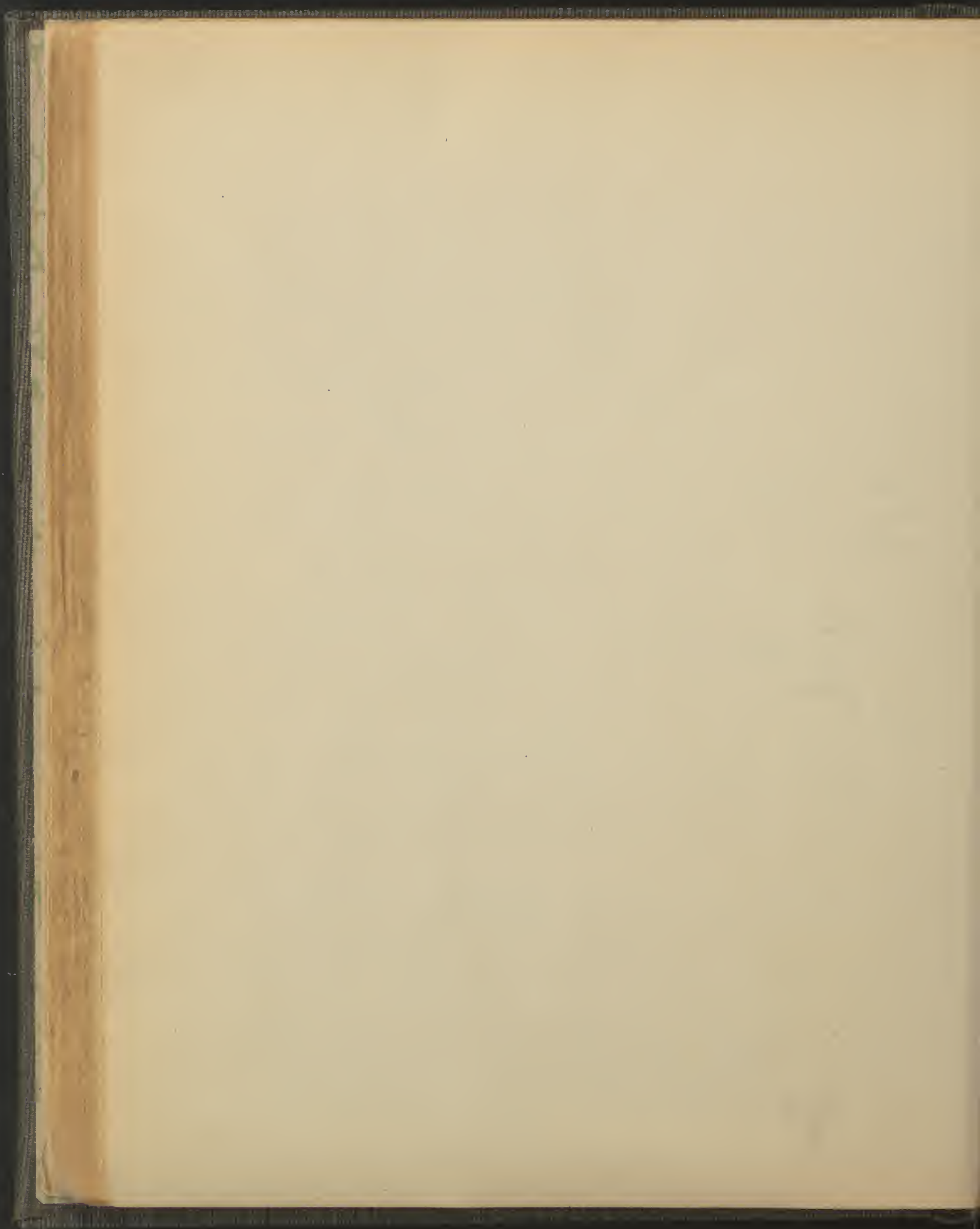


be coiled up principally in the umbilical and hypogastric regions producing an appearance somewhat similar to the upper surface of the brain and hence called the convolutions of the small intestines. The large intestine begins by a sudden dilatation at the termination of the small intestine in the right iliac region and extends to the termination of the alimentary canal at the apical orifice, some 5 feet.

It is sinuous in its course and is divided into three portions, caecum, colon and Rectum.

The entrance of the ileum is not into the extremity of the large intestine but is so situated some two or three inches above its commencement and the blind pouch or cul de sac which lies below this aperture is called the Caecum which is the largest portion of the large intestine, about two and a half inches in length lies in the right iliac fossa, continuous with the colon above and below has projecting from its lower inner back portion a tail-like hollow narrow process called the appendix vermiformis, which is from four to six inches in length, lies coiled up on the back of the caecum has no opening below but its cavity is continuous with that of the caecum above.

The colon is the second portion of the large intestine, it commences at the entrance of the ileum, which is the mark of division between it and the caecum, in the right iliac region and passes upward through the right lumbar region to the under surface of the liver in the right hypochondriac region: this portion is called the ascending colon: at this point the colon makes a bend called the hepatic



flexure and turns to the left across the abdomen to the lower extremity of the spleen; this portion is called the transverse colon and in its course corresponds to the situation of the superior horizontal line of the abdomen; at the lower extremity of the spleen in the left hypochondriac region the colon makes another bend called the splenic flexure and turns downward to pass through the left lumbar region to the left iliac fossa, this portion is called the descending colon, in the left iliac region the colon makes an abrupt turn upon itself first upward and to the right and then downward and to the left and this is known as the sigmoid flexure of the colon which terminates at the brim of the pelvis, in front of the left sacro-iliac symphysis is the third and last portion of the large intestine commencing where the sigmoid flexure terminates (at the left sacro-iliac symphysis) it passes down on the front of the sacrum to the anus being approximately straight in its course and hence its name.

- Structure -

Common to the whole extent of the alimentary canal in the abdomen (with a slight exception) are the following coats.

- 1st Coat of the visceral layer of the peritoneum -
- 2^d The innermost coat is mucous membrane and between these are two muscular coats, the outer one beneath the serous coat is 3^d the longitudinal; the inner lying next to the mucous coat is 4th the circular muscular coats: the words longitudinal and circular indicating that the fibres run in the di-

From Cook up to the

1st confluence in the river - 100 yds

2nd confluence which is the point

3rd confluence the phylloids - 100 yds
of the
Caucasian

section of the canal or pass around it. These several coats are held the one to the other by means of interposed areolar tissue. In addition to this each part presents some points peculiar to itself. The Stomach has 1st externally a serous coat which besides investing it passes off to adjoining parts, forming the ligaments (?), or as they are called the omenta of the stomach which serve to retain it in position, it is held to the liver by the gastro-hepatic or lesser omentum, to the spleen by the gastro-splenic omentum -- to the transverse colon by the great omentum (gastro-colic).

The 2^d coat of the stomach just beneath the serous is the longitudinal muscular; the 3^d just beneath this, is the circular muscular which is thickest towards the pyloric extremity while the longitudinal is the thickest along the lesser curvature. The 4th coat of the stomach is a partial one of oblique muscular fibres which diverge from the cardiac orifice beneath the circular fibres in an oblique direction around the splenic end and terminate before reaching the pylorus.

The (5th) fifth coat is the internal mucous membrane which when the stomach is empty is thrown into longitudinal ridges called rugae disappearing when the stomach is filled. At the pylorus the mucous membrane is thickened and beneath this thickening is an aggregation of the circular muscular fibres so as to produce a sudden contraction of the tube, this appearance is known as the pyloric valve.

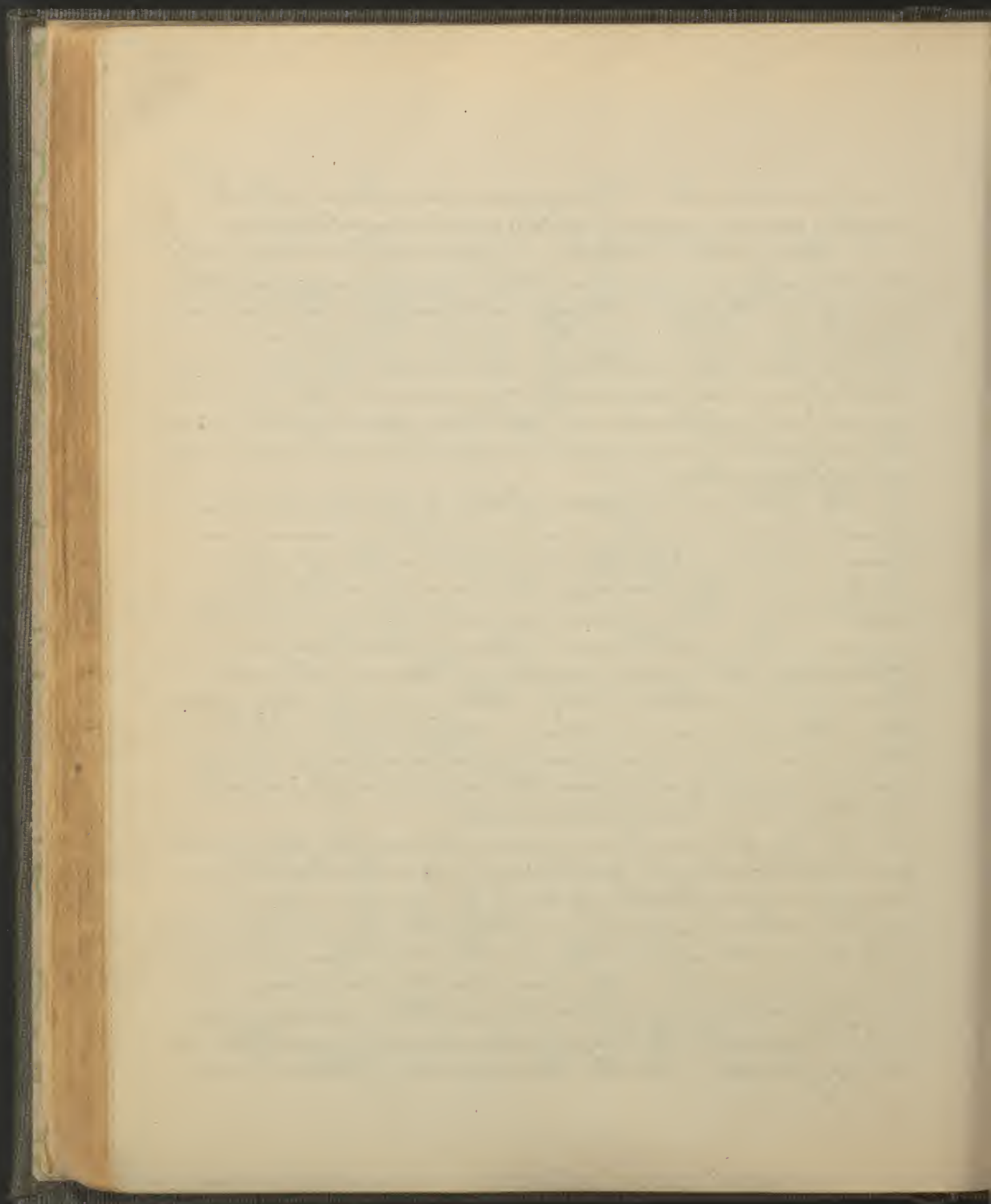
The Duodenum has four coats 1st external is the serous (partial) 2^d longitudinal muscular - 3^d

The Papilla is found about
4 or $4\frac{1}{2}$ in below the P₂ loric
surface and lower in back
part.

circular muscular... 4th mucous membrane which in the commencement of the gut is smooth but is soon observed to be thrown into circular ridges called valvulae conniventes, which do not surround the cavity of the gut entirely but usually stop short at $\frac{3}{4}$ or may reach $\frac{5}{6}$ of the circuit. These valvulae conniventes are continued down into the jejunum and ileum but gradually decrease in size and become inconspicuous in the lower part of the ileum. The valvulae conniventes are permanent, distension not affecting them. ^{valv}

On the lower inner part of the perpendicular duodenum is seen a prominence of the mucous membrane called a papilla on which is the aperture for two ducts the common bile duct and the pancreatic duct. The jejunum and ileum have the same coats in the same order as the duodenum. Studding the inner surface of the small intestines are numberless hair-like microscopic projections from the mucous membrane called villi and besides these and numerous mucous follicles found throughout the small intestines there are some glandular bodies which have special seats.

In the duodenum are numerous small glands the size of the head of a pin lying just beneath the mucous membrane and opening by ducts on its free surface, these are known as the glands of Brunner. Scattered throughout the small intestines but much more numerous in the lower part of the ileum are small round grayish bodies in the mucous membrane which have no duct and are called solitary glands - In the lower part of the ileum

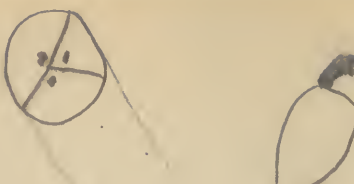


and extending upward come ten feet or more or more in a few instances in the duodenum are found a number, from 25-35 sometimes 40 rarely more - though in one instance 54 - of oblong dark colored patches called the Peyerian glands or Peyer patches. The long diameter is in the direction of the gut. - these patches are aggregated masses of the solitary glands and become diseased in typhoid fever.

The opening of the small intestine into the large is by means of a horizontal slit-like aperture situated on the inner side of the large intestine some 2 1/2 inches from its commencement and is guarded by a valvular arrangement called the ileo-caecal or ileo-colic valve which consists of two projections into the cavity of the large intestine one above and the other below the slit or button-hole like opening, these segments consist of folds of the mucous membrane covering circular muscular fibres.

The Large Intestine as in the previous portions of the intestines has four coats external serous internal mucous and between these two muscular, an outer one longitudinal and an inner circular. From its commencement to the rectum the longitudinal muscular coat is not uniformly distributed around the gut; but the fibres are gathered into three narrow flat bands placed one in front one on the back and one on the concave (lower) aspect of the gut and moreover these bands are shorter than the other three coats of the intestine to which they are attached and in consequence of this the other coats are thrown into folds or puckered prominences with corresponding depressions and these appearances are known

Perebrinaria is much farther down on
the front of the retinaculum than behind



as the sacculi of the large intestine, towards the termination of the colon these bands begin to be diffused and in the rectum the longitudinal fibres are again uniformly distributed and of equal length with the other coats.

The mucous membrane of the large intestine is stated above to thin into sacculi as far down as the rectum by reason of the shortness of the longitudinal muscular fibres; beneath it especially in the upper portion of the gut are seen a number of solitary glands which differ from those in the small intestine in having a duct.

The Rectum presents some important departures from the above description which must here be noticed.

It is usually divided into three portions the first portion extends from the commencement of the gut until it ceases to incline to the right, that is until it reaches the middle line of the sacrum; the second portion extends from this point to one opposite the tip of the coccyx; the third portion is the last inch of the gut which here inclines backwards to terminate in the anus. The Rectum presents the same four coats in the same order, as the rest of the intestine but with the following variations.

1st The serous coat is a partial one, the upper half of the gut is entirely surrounded by peritoneum, but the lower half is devoid of a serous coat behind, while in front it is continued down only about an inch farther than it is behind; in other words starting from the anus we say that the rectum has no serous coat posteriorly for four inches about; that it has no serous coat in front for three inches (at this latter

There is no such thing as an anti-sphincter - B.T. 92

about the peritoneum having left the rectum altogether to mount upon the back of the bladder in the male and on the vagina and uterus in the female.) The fibres of the longitudinal muscular coat become much more distinct and of a reddish color in the lower part of the gut and when they reach the very extremity they do not stop short but turn upward again to run up on the inner face of the circular muscular fibres being now separated from the cavity of the gut only by the mucous membrane and from the descending longitudinal fibres by the circular fibres. These longitudinal fibres which ascend beneath mucous membrane are gathered into separate bundles or columns which pass up some inch or two before ceasing and these columns throw the mucous membrane into longitudinal ridges with intertwinning depressions. Towards the lower extremity of the rectum, the fibres of its circular muscular coat are aggregated into a thickened ring (internal sphincter ann) and just above this the cavity of the gut is seen to be considerably dilated forming a capacious reservoir in cases of long continued constipation.

The Liver.

The liver is found stretching across the abdomen just beneath its roof lying in the right hypochondriac, the epigastric and to some extent in the left hypochondriac regions. Above it is the diaphragm, below it are the hepatic flexure of the colon, the right kidney and suprarenal capsule the ascending duodenum and the stomach, (the left extremity of the left lobe of the liver sometimes rests upon the upper extremity of the spleen). The liver is semi-ovoidal in shape, in size

Tumors. Dermis

Def. - is an abnormal proliferation of a recess

Describing. ¹ integ - ² layers of Sup. fascia - cut anty - skin

Symph. glands - Size of bean. rec. lymph - from - periman - Spiculate
 + leg - The deep groove is Epiploic + iliac + long saph. vein
 + cutaneous nerves.

The ^{superficial} layer of fascia passes from abdomen wall to thigh
 + is not adherent

The - deep layer which is beneath the foregoing named res
 is adherent to fascia lata for several inches
 ext + below. ^{sup. opening} also to outer surface of Psoas lig
 Int. to saph. opening it is not adherent + extends
 up to C. ubberatus lig before becoming adherent.

Fascia - lata. attached outer lip of crest of Ilium
 " " " " surface of Psoas lig
 " " " " ant edge of inner lip each pubic

Saphenous opening when you have taken off the superficial
 fascia and see long saphenous vein which comes from
 the deep fascia and makes coat of res to enter the
 femoral vein.

That pt of the deep layer of superficial fascia = Cutis
 fascia - (is a peculiar devel. of fascia lata)

Sup. opening. not circular. is oval. large end down + out
 small " " up + in

it is larger than is necessary as it has to move + if it filled
 the vein close on movement you would have
 constriction.

The pt. of fascia ^{lata} ext to penis is iliac. attached
 " " " " int " " " pubic.

Thoe { The sup - crura is attached to spine of pubis + psoas.
 " " " " " " " " " "

it weighs about four pounds, in length it is about 12 inches in breadth about six inches, its greatest thickness about 3 inches, in color it is a dull red occasionally having a purplish or yellowish tinge - in structure it is a solid glandular organ -

The liver is divided for purposes of study into an upper and a lower surface, an anterior and a posterior border, five ligaments and an excretory apparatus -

The upper surface is a mostly convex being moulded on the concave under surface of the diaphragm and presents the glistening appearance due to the visceral layer of the peritoneum - which passes down from the under surface of the diaphragm to envelop it in an antero-posterior fold which strikes the upper surface of the liver much nearer the left extremity than the right, this fold is known as the longitudinal ligament and is the mark of a division which has been made of the liver, all that portion lying to the right of the longitudinal ligament being called the right lobe and all that portion to the left, the left lobe. The Anterior Border of the liver is thin and sharp and just where the longitudinal ligament intersects it is a notch which is another mark of separation between the right and left lobes - The anterior border is above the lower border of the ribs, though when the liver is enlarged it may be felt through the abdominal parietes -

The Posterior Border is thick and rounded and marked by a notch where it is intersected by the longitudinal ligament which is the 3^d mark of division between the right and left lobes (on this border are the openings of the hepatic veins and it is grooved

The inner margin of clac foramen is curved like a sickle \therefore falci-
form lig.

Pubic foramen - att. Gird lig. to front of pubis & ischio pubic ramus
& passes behind the sheath of the femoral ves. \therefore you see there is
an interval between the pubic & clac foramen & \therefore this aperture
contains the femoral ves.

The sheath enclosing the vein & abt. 6 to 8 days is femoral from above
down.

from abdomen down.

You know keeps flex. femoris. - the femoral ves. - enter nerves
pass beneath psoas lig.



body of pubis

= 1,006 feet -

The iliac foramen throws an arch way over the ves. but
the body of it passes behind them & becomes continuous with
the transverse foramen & as it passes over psoas lig.
it is adherent -

Now as has been before said the sheath of the ves. is
too large - & this enlargement extends to opening of septum
fem. - & is called the crural canal. & the re-
-currence extends from the inner side of femoral vein
& commencement is known as the femoral ring
int. base of Gird lig
ext. by vein
below bone body of pubis
above - psoas lig.

boundaries of fem ring

Relations of this ring -

1) covers 2) Peritoneum - 3) aciclar tissue - 4) Septum
femoralis - is a contraction process of psoas

by the vena cava inferior).

The under surface is marked from before backward by a fissure called the longitudinal, which is just opposite to the longitudinal ligament on the upper surface and extends from the notch in the anterior border to the one in the posterior border, this is the fourth mark of division between the right and left lobes.

The under surface of the left lobe presents a deep groove called the transverse fissure which extends to the right from the longitudinal fissure at a point about one third from its posterior extremity; in this transverse fissure are found the hepatic duct to the right (and slightly in front); the hepatic artery to the left; and between and behind these two the portal vein. That portion of the longitudinal fissure which is behind the intersection of the transverse fissure is called the venous fissure and that portion in front the umbilical fissure which is frequently crossed by a narrow strip of liver tissue called the bridge of the liver - *Fons and Hepatis* - Lying in front of the transverse fissure and producing an impression on the under surface of the right lobe is the gall-bladder and between this and the longitudinal fissure is a square-shaped portion of the liver which is called the *Lobus quadratus* whose limits are in front of the anterior border of the liver, behind the transverse fissure to the right the gall-bladder, to the left the longitudinal fissure. Behind the transverse fissure in another portion of the liver which has received the name of the *Lobus Spigelii* which is three-sided and has in front the transverse fissure to the left the longitudinal fissure (venous) and to

Spread in it and is attached to borders of ring except
Ext. when it is attached to int. phloem of sheath of Reim.
on this septum is a gland
having cut this away now observe the ring.

Deep Epigenetic

is above & to outer side

Its pubic branch is above & int. to it. especially at its commencement.

Now once in $3\frac{1}{2}$ lines it forces close to vein ¹⁰⁰⁶
+ ... less complicating as you have seen int. any how.
or may be a highly developed house.

a Principle of just goes out forward ring to the bottom
+ now ... it bulges forward = complete

before it escapes the fascia lata

below & ext. to space of pubes. covered by skin & sup. for.
What direction does it pass?

Now as the pubic pube of fascia lata is not very
adherent you see it pushes its self up & in.

9/- line is below & ext. is forward.

above & int. = inguinal

Reduce it by knots - & release fascia lata

Correct

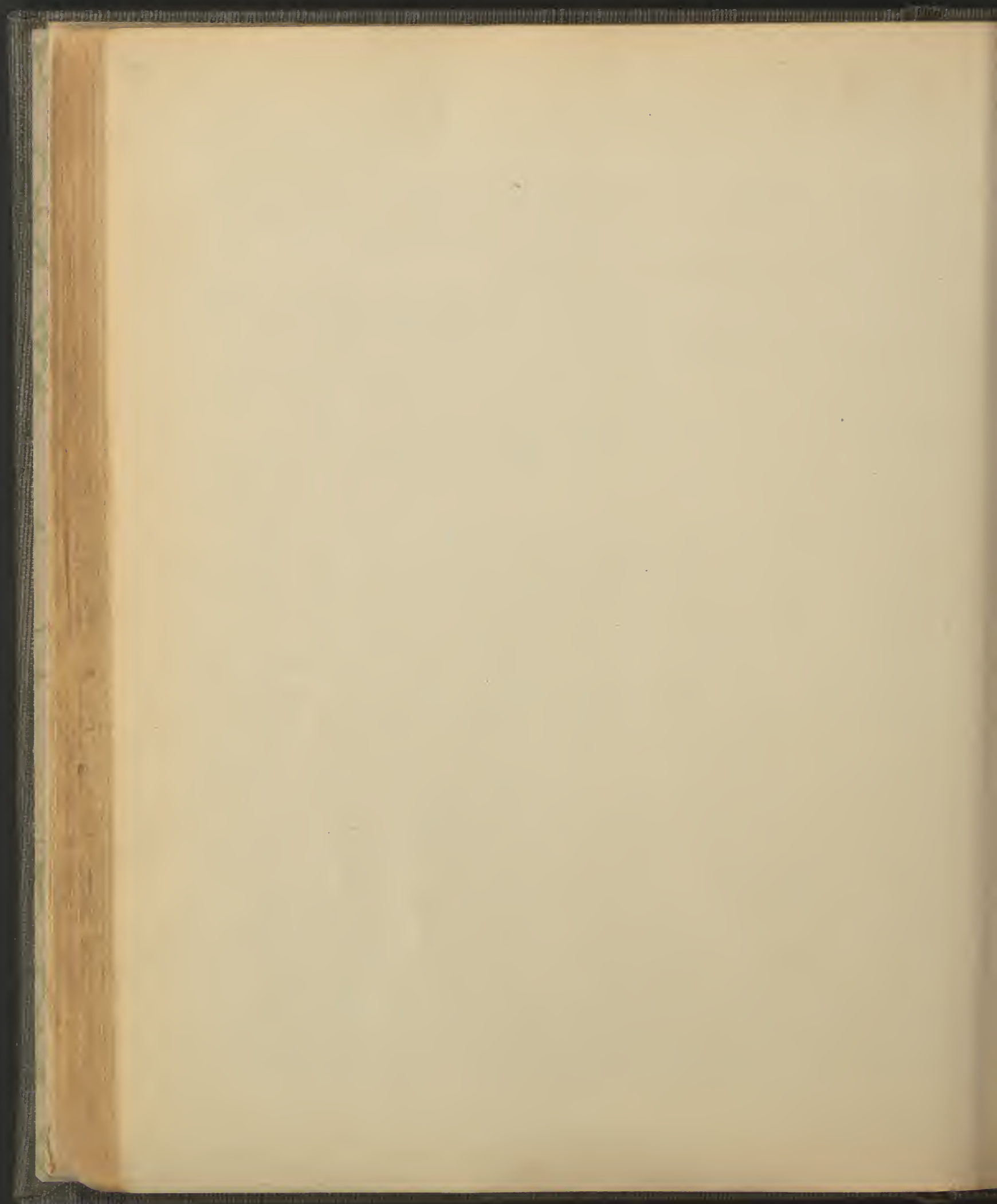
- 1) Penetration
2) Aerial line
3) Septum curv.
4) fascio of penum res.

the right a deep groove made by the inferior vena-cava, running out to the right from the front of the lobus Spigelii; just behind the transverse fissure is a ridge called the lobus caudatus.

Near the anterior border the under surface of the right lobe presents an impression made by the hepatic flexure of the colon and behind this near the posterior border another impression made by the right kidney and supra-renal capsule.

The liver is held in position by processes of the peritoneum called ligaments - there are five in number -

1st. The longitudinal or suspensory consists of two layers of peritoneum which pass from the under surface of the diaphragm to the upper surface of the liver these two layers separate on reaching the liver and completely invest it with two exceptions, one in the space which is occupied on the under surface by the gall-bladder for the peritoneum when it reaches the gall-bladder instead of passing between it and the liver leaps over it so as to retain it in position, the second exception is found on the posterior border for when the longitudinal ligament reaches the posterior border its two layers are seen to diverge from one another the one to pass to the right end of the liver and form the right lateral ligament the other passes to the left end to form the left lateral ligament, these two ligaments being nothing more than the points where the visceral layer of the peritoneum covering the liver becomes continuous with the parietal layer - Now between the diverging layers of the longitudinal

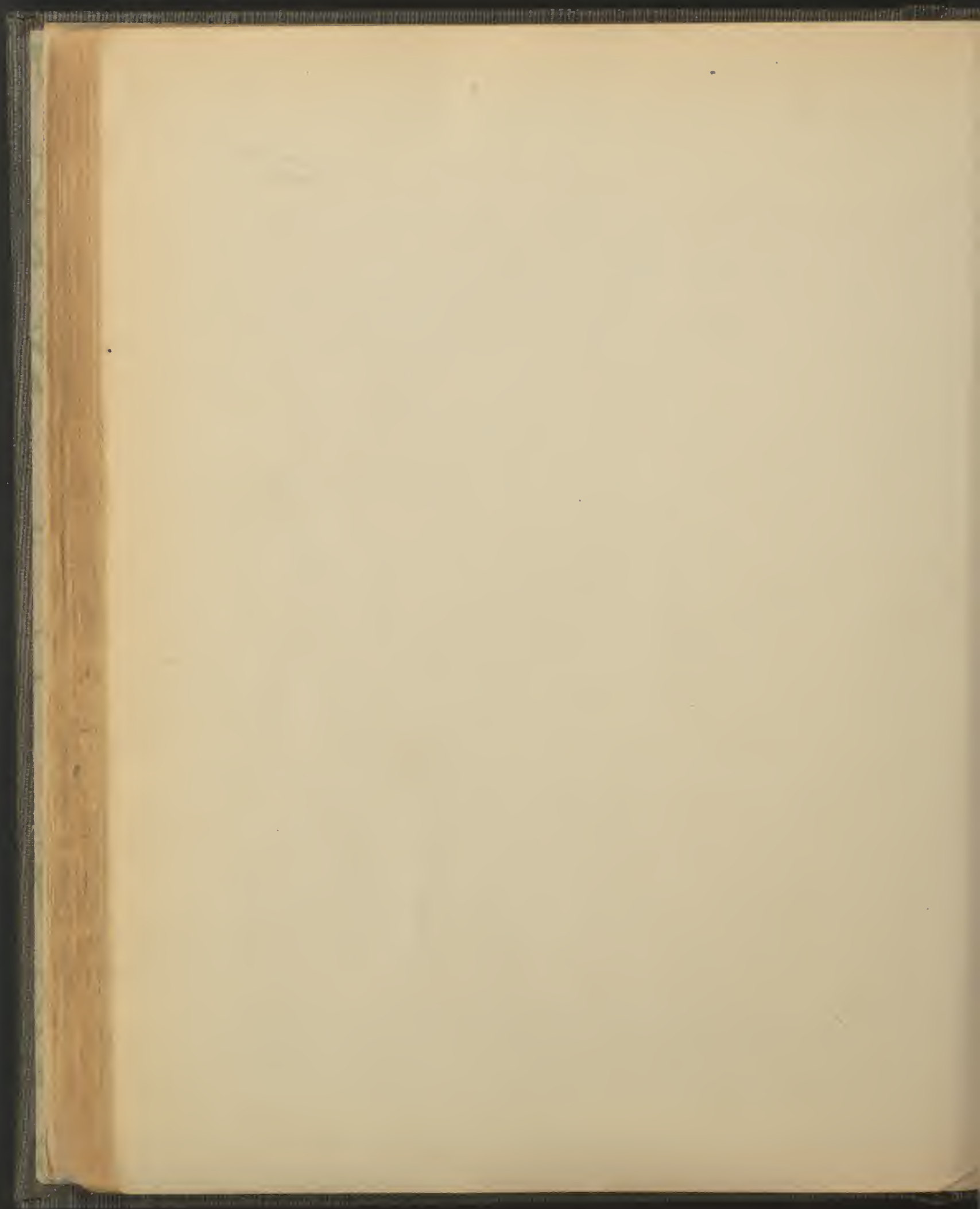


ligament on the posterior border is space triangular in shape which is left devoid of serous coat and the space as they shift this space is known as the coronary ligament. The fifth ligament is called the Round and is found as a rounded cord in the front edge of the longitudinal ligament (it being the shrivelled umbilical vein.)

The Excretory apparatus consists of a series of ducts and a reservoir called the gall-bladder.

The Gall-bladder is a membranous pyriform sac lying on the under surface of the right lobe of the liver, its large end being forward and usually falling short of reaching the anterior border though occasionally projecting beyond. Its small end lies backward terminating at the transverse fissure in a neck which becomes continuous with a duct called the cystic, this is about one inch long and unites with the duct from the liver to form the common bile duct. The Gall-bladder has three coats its external coat is serous and is only a partial coat since it covers over the gall-bladder from the liver leaving that part of the liver and the gall-bladder which are in contact uninvested. The next coat is fibro-muscular. The internal coat is mucous which in the neck of the gall-bladder is thrown into a fold which is arranged in a spiral manner so that liquid in following this spiral can flow but slowly.

In the transverse fissure two ducts one from the right lobe and one from the left lobe unite to form a duct called the Hepatic duct which is about two inches long and descends to unite with the cystic



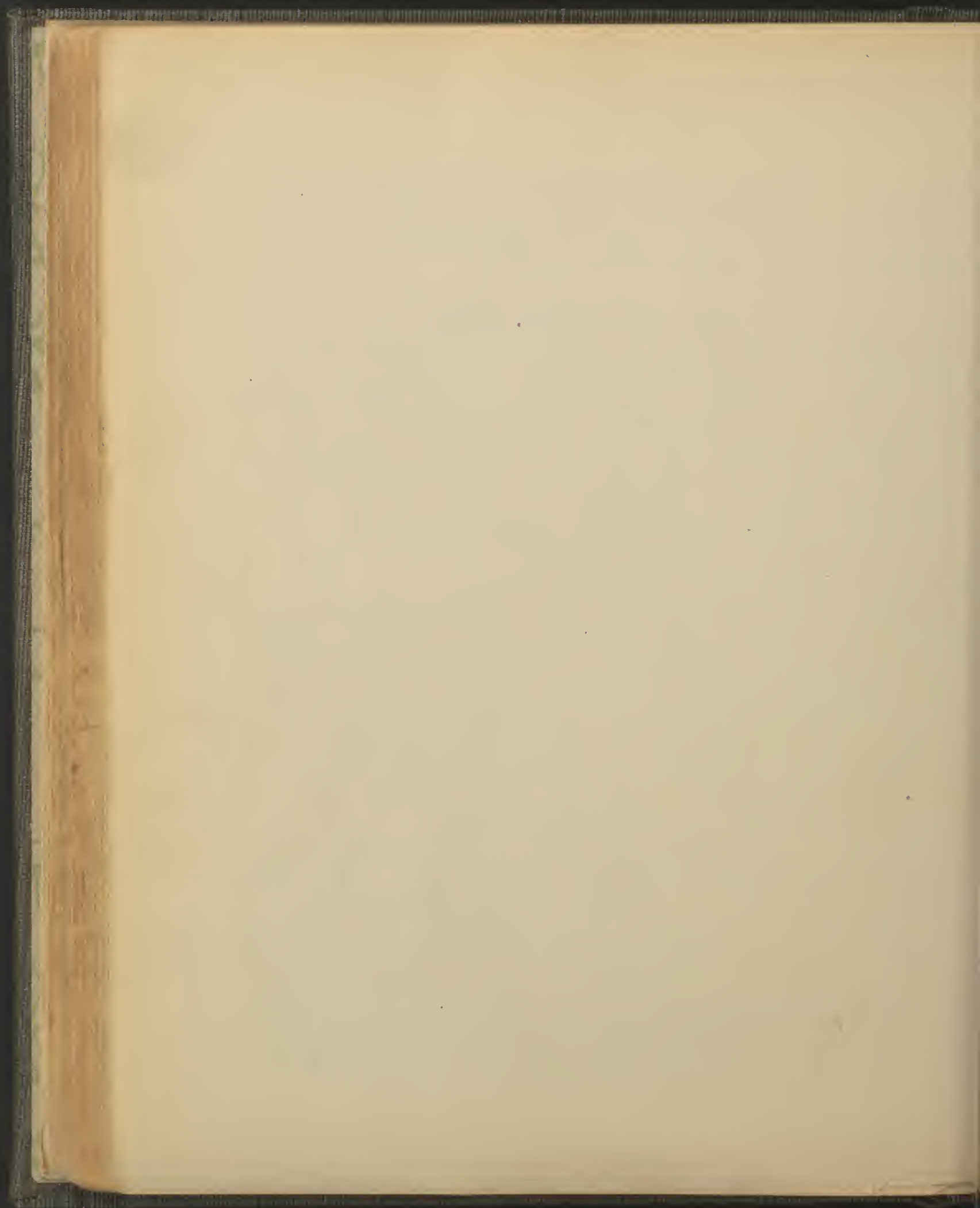
duct and then form the common bile duct or ductus communis choledochus, which descends for about three inches to open into the perpendicular duodenum on a papilla seen at its lower inner part.

Structure of the Liver.

The external investment of the liver is the serous coat which is complete with the exceptions mentioned in the description of its ligaments. Beneath the serous coat is a white fibrous coat which everywhere covers the liver tissue and moreover gives off from its inner surface numberless processes which pass into the substance of the liver and divide it into numerous subdivisions called lobules these being made up of the proper liver tissue.

Looking at the transverse fissure there may be seen the three vessels which ramify in the liver to fulfil the following three offices, 1st the artery called Hepatic carrying arterial blood to the liver. 2^d A vein called the Portal which likewise forms a stream of venous blood into the organ. 3^d Third the Duct called Hepatic which has resulted from the coalescence of numerous smaller ducts from the lobules, conveying away the bile secreted by the liver.

When traced into the liver these three sets of vessels are found associated throughout the organ. Now there must be some provision to remove the venous blood from the liver, and this is accomplished by a fourth set of vessels, called the Hepatic veins, which result from ramifications which are not associated in position with the first three vessels, but which open by three or four separate apertures on the posterior border



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of the organ so as to be convenient to the inferior vena
cava into which they empty

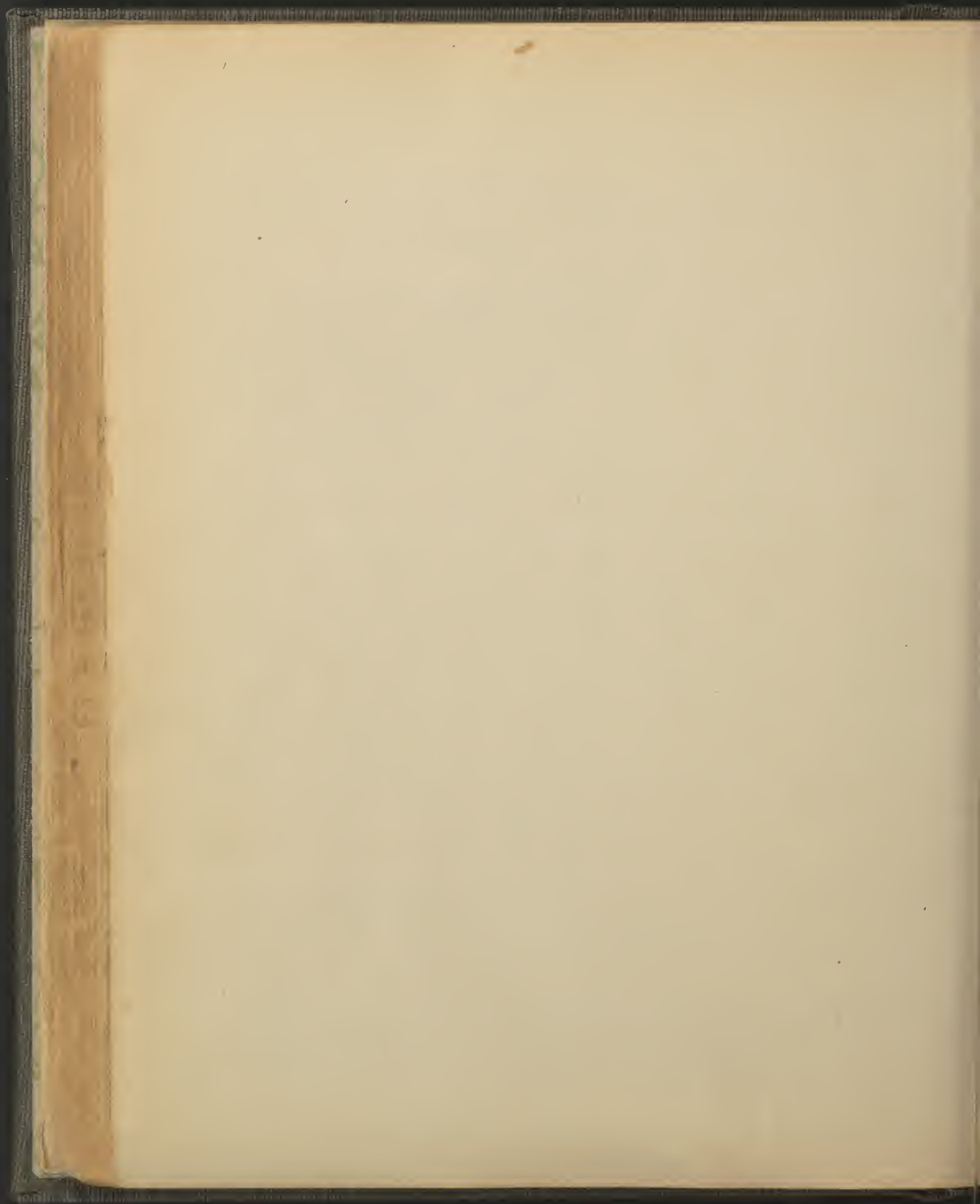
- The Pancreas -

The pancreas is a lobulated gland of a pale color in
size from 6 to 7 inches long, in thickness and in
depth varying in different parts from less than half
an inch to an inch and a half, in weight some-
times about three ounces, found lying horizontally be-
hind the stomach, with its large end or head em-
braced in the concavity of the Duodenum with its
small end or tail to the left and in contact with the
inner aspect of the spleen and crossing in its course
the body of the first lumbar vertebra, which renders
its posterior aspect concave whereas its front is convex.

The head or right extremity of the pancreas is much
the larger portion of the organ and sends downward
a considerable projection at right angles to the rest
of the organ, owing to which the organ has been liken-
ed in shape to a hammer; and moreover the head
furnishes a prominence backward and to the left
which is sometimes called the lesser pancreas and
is found lying behind the Superior Mesenteric
vessels.

- The Pancreatic Duct -

The secretion of the pancreas, the pancreatic juices, is
collected and conveyed away by a duct called the
pancreatic or Duct of Wirsung, which commences
in the tail of the pancreas by a forked origin; these
two branches in passing to the right unite, the
resulting duct continues along constantly growing
by momentary accessions until it reaches the right



extremity of the organ where it pierces the coats of the perpendicular duodenum to open on the papilla common to it and the common bile duct.

Somewhere just before leaving the pancreas the pancreatic duct receives the duct from the lesser pancreas. In structure the pancreas is a lobulated gland, it lies behind the peritoneum and is consequently only covered in front by a serous coat.

- The Spleen -

The spleen lies vertically in the left Hypochondriac region.

It is invested completely by peritoneum which forms two folds to retain it in position the first is called the suspensory ligament which suspends the spleen by its upper extremity to the under surface of the diaphragm, the second is called the gastro-splenic omentum which passes between the inner surface of the spleen and the contiguous large end of the stomach.

In color a dark red, in shape, semi oval, in consistence extremely fragile, (in size, about 6 inches long, about 3 inches broad, about one inch and a half thick and weighs about 7 ounces), the spleen may be divided for study into two surfaces, two ends and two borders. The external face is convex to correspond with the sweep of the abdominal wall; the internal face is concave to hug the great end of the stomach and presents about its centre a vertical groove, called the hilum, where the branches of the splenic artery find ingress and the veins egress and where the gastro-splenic omentum is attached.

The night Riders as the townfolk

The upper extremity of the spleen is much larger than the thinner and more pointed lower extremity. The posterior border is thicker and more rounded than the anterior, which latter, almost always presents several notches.

- Structure -

The Spleen is invested by two coats, the external is the serous; beneath this is a fibro-elastic coat which sends off from its inner surface processes, called trabeculae, in the interspaces between which is found the proper tissue of the gland (or lymphoma) or splenic pulp, which consists of numerous corpuscles called splenis (Malpighian), blood vessels, granules, and numerous blood corpuscles in varying stages of degeneration. The spleen is a (blood-vascular) or ductless gland and whatever it elaborates is carried off without the aid of a special duct.

- The Kidneys -

The kidneys are two organs, found, one on each side of the vertebral column, in the lumbar regions, the left kidney extends from the upper border of the 11th rib to near the crest of the ileum, the right from the lower border of the 11th rib to near the crest of the ileum - being some $\frac{1}{2}$ inch lower than the left; they correspond to about the 12th Dorsal and 1st & 2^d lumbar vertebrae (diverging somewhat as they descend); they lie imbedded in a mass of fat behind the peritoneum which touches them only for a slight extent at their front upper portion, perched on the upper inner part are the two supra-renal capsules. The Kidney is about four inches long, about two broad, and about one thick - It is peculiar in outline, hence the word semi-

Wright K. is correct

form or kidney-shaped - the anterior surface being convex, the posterior being slightly flattened the upper end being larger - the outer being convex, the inner border being concave and presenting a depression called the hilum through which the blood vessels and duct of the kidney pass, in the following order, the renal vein in front, the duct of ureter behind &c... 1. Between these the renal artery - The hilum leads to a cavity in the organ called the sinus. It weighs from 4-5 ounces.

- Structure -

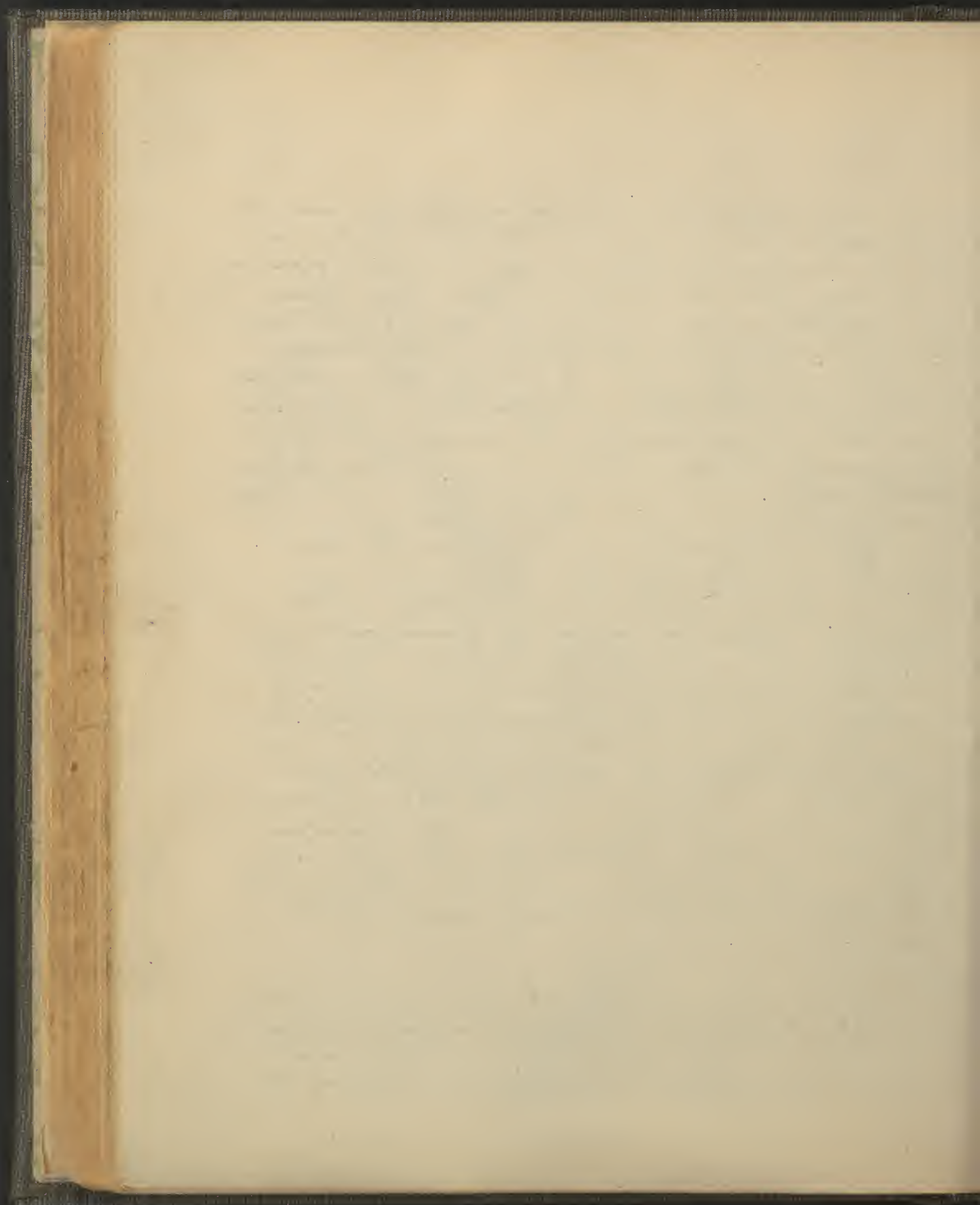
The kidney is invested by a fibrous coat which can be easily stripped off, thus exposing the proper tissues, to study which the kidney should be split in half longitudinally and through its width - It is then seen to consist of two portions, the outermost layer is red in color and forms about $\frac{3}{4}$ of the organ, being called the cortical portion: within this is seen a portion called the medullary portion, of a lighter red color and formed into conical masses called the pyramids of Malpighi: these pyramids from 8-18 in number are arranged with their bases at the inner surface of the cortical portion and their apices towards the hilum. Each pyramid consists of hundreds (200-500) of straight minute tubes leading from the cortical portion, where the urine is excreted, to the apex (or papilla) of the pyramid - where they discharge the urine which they convey. These pyramids are separated by prolongations of the cortical substance which dips between them - The urine which drops from the apex of each pyramid is carried off through coalescing ducts bearing different names, all of which finally terminate



in one duct, called the ureter, which itself opens into the bladder - The course which the urine takes can better be understood by following, first, below upward the channel through which it flows. Thus beginning with the ureter we trace it up to a short distance before it reaches the hilum of the kidney and observe it here begins to enlarge, this enlarged part is called the Pelvis of the Ureter, which entering at the hilum occupies the sinus of the Kidney - now the Pelvis soon divides into three tubes called Infundibula, one infundibulum collecting the urine from the upper third of the organ, one from the middle third and one from the lower third. Each infundibulum after a short course subdivides into a number of smaller tubes called calices, each calyx terminating by surrounding the ^{capitulum} apex of one or more of the pyramids. Hence the course of the urine which is secreted in the cortical portion is 1st through the uriniferous tubules which form the pyramids of Malpighi 2^d dropping from the ^{apex} of the pyramid, it falls into a calyx which 3^d unites with the other calices of its third of the organ to form an infundibulum which 4th combines with the other two infundibula to form 4th the Pelvis, which 5th contracts into the ureter which 6th and lastly, opens into the bladder.

- Ureter -

The Ureter commencing at the kidney in a dilated portion called the Pelvis takes up its course for the bladder contracting to a small diameter (the size of a goose quill) it passes down beside the



rectal column to the margin of the pelvis, then descends into the pelvis behind the bladder and approaching the ureter from the other kidney they open into the back part of the base of the bladder by two apertures some two inches apart, perforating the coats of the bladder in an oblique direction. In length the ureter is some 16-18 inches.

In structure the ureter lying behind the peritoneum consists of three coats (and this description applies to urine, infundibula and calices), an external fibrous an internal mucous and between these the muscular which consists of external longitudinal fibres and internal circular and it is to be noted that in the lower portion of the ureter towards the bladder there is another muscular coat which consists of longitudinal fibres lying internal to the circular fibres between them and the mucous membrane.

- The Bladder -

The bladder is the reservoir for the urine being a membranous sac lying in the pelvis just behind the symphysis pubis, in the male in front of the rectum, in the female in front of the uterus and vagina. Its shape is when distended ovoidal or pyriform the large end of the ovoid being below, when empty it is flattened against the pubes and is somewhat triangular. - Its direction is downward and backward. - Its capacity is very variable though in health the urine is discharged when it has collected to the amount of from $\frac{1}{2}$ to 1 pint. Its upper third, about is called the superior summit or apex, its middle third the body, its lower third the base or fun-

We give this year the exit of the culture
as apex of maximum power

due - The channel through which the urine escapes from the bladder is called the Urethra whose aperture is seen on the lower front portion and this part of the bladder is the neck which lies imbedded in the base of the prostate gland. In structure the bladder consists of three coats, 1st The internal is mucous membrane, which at the neck of the bladder presents a slight prominence, often absent, called the *uvula vesicae* seen just at the entrance of the Urethra, now between this uvula in front, as its apex and the openings of the ureters as its two posterior angles, is a triangular space called the *trigone of the bladder* or *trigone vesicae* whose base is a line connecting the two openings of the ureters and its sides each formed by a line drawn from the opening of an ureter to the *uvula vesicae*. The latter line corresponds to a ridge of the mucous membrane produced by a bundle of longitudinal muscular fibres (from the ureter). This space is by far the most sensitive portion of the mucous membrane and corresponds in position to a similar space on the exterior of the base. 2^d The muscular coat which is connected to the mucous membrane by a layer of areolar tissue; the muscular coat consists of longitudinal and circular fibres, the longitudinal fibres from two layers between which are found the circular fibres. The circular fibres are aggregated into a considerable mass at the neck of the bladder so as to keep closed by their tonic contraction the opening of the urethra. 3^d The external coat is a serous one and is partial; in the male it covers the summit, sides, posterior aspect and posterior part of the

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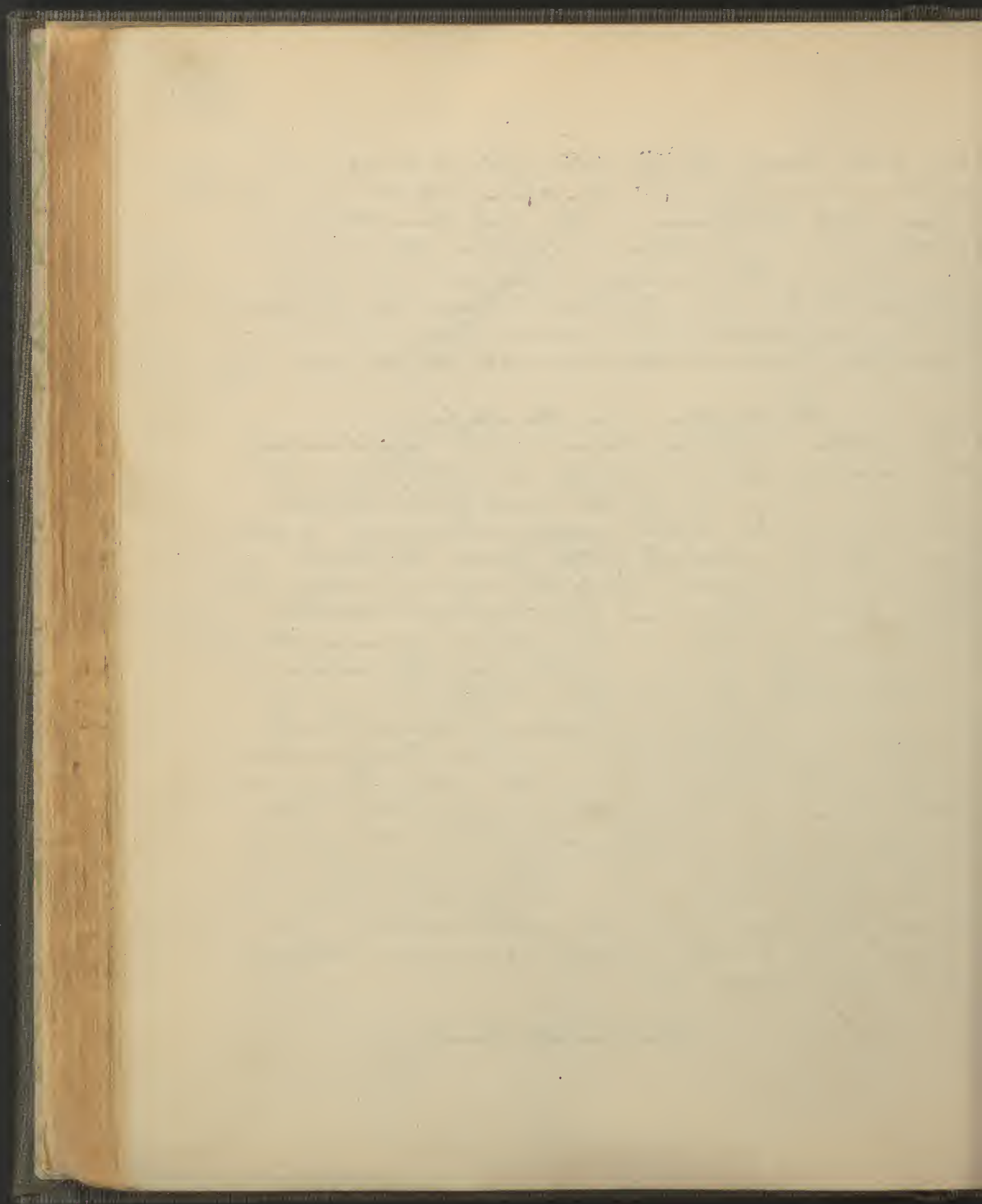
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base of the bladder leaving uncorrued its front and the front part of its base. (In other words the visceral layer of the peritoneum in the male leaves the front of the rectum some three inches above the anus to mount upon the posterior surface and sides of the bladder to its summit where it leaves it and passes to the inner surface of the anterior abdominal wall and thus becomes continuous with the parietal layer.

The Urethra - (In the Male) -

The urethra is the last division of the canal which the urine traverses in seeking an outlet from the body. It commences at the neck of the bladder and terminates at the meatus urinarius, its opening on the free extremity of the penis. Its length is variously estimated owing to the varying length of the penis which it traverses. It is divided into three portions, the prostatic portion which begins at the opening in the bladder and traverses the substance of the prostate gland to appear at its apex, after a course of an inch and a quarter to become 2^d the membranous portion which extends three quarters of an inch to enter the bulb of the corpus spongiosum of the penis and become the spongy portion. The spongy portion is continued forward (through the corpus spongiosum) to the meatus urinarius and is much the longest and most variable portion in length; the largest portion being the prostatic - The length of the urethra usually given as a whole is seven and a half inches.

- The Prostate Gland -



The prostate gland is a small horse-chestnut-shaped body found in the male lying with its base against the neck of the bladder and its apex projecting forward about 1.4 inches; its base is 1.3 inches about and it is about $\frac{1}{2}$ inch in depth. It lies invested in cellular tissue and has a proper fibrous capsule; it consists of interlacing muscular fibres (crossed in the interstices of which are situated the follicles of the gland which secrete a milky fluid).

The gland is divided into three lobes, two lateral and an inferior (isthmus). Passing through it is the prostatic portion of the urethra which is nearer the upper surface than the lower.

On the floor of this portion of the urethra is seen a prominence of the mucous membrane some $\frac{1}{2}$ inch long called the *veru montanum* on each side of which, where the floor of the urethra is slightly sunken, are some 11-15 apertures the openings of the ducts from the prostatic follicles, and in front of the *veru montanum* is a small saccular cavity projecting backward and called the *sinus peculiaris*. Opening at either side of the orifice of this sinus is seen a small aperture; these are the terminations of two ducts, (ejaculatory) which pass back to two lobulated oblong bodies seen just behind the prostate gland, on the under surface of the bladder called the *seminal vesicles*.

- Seminal Vesicles -

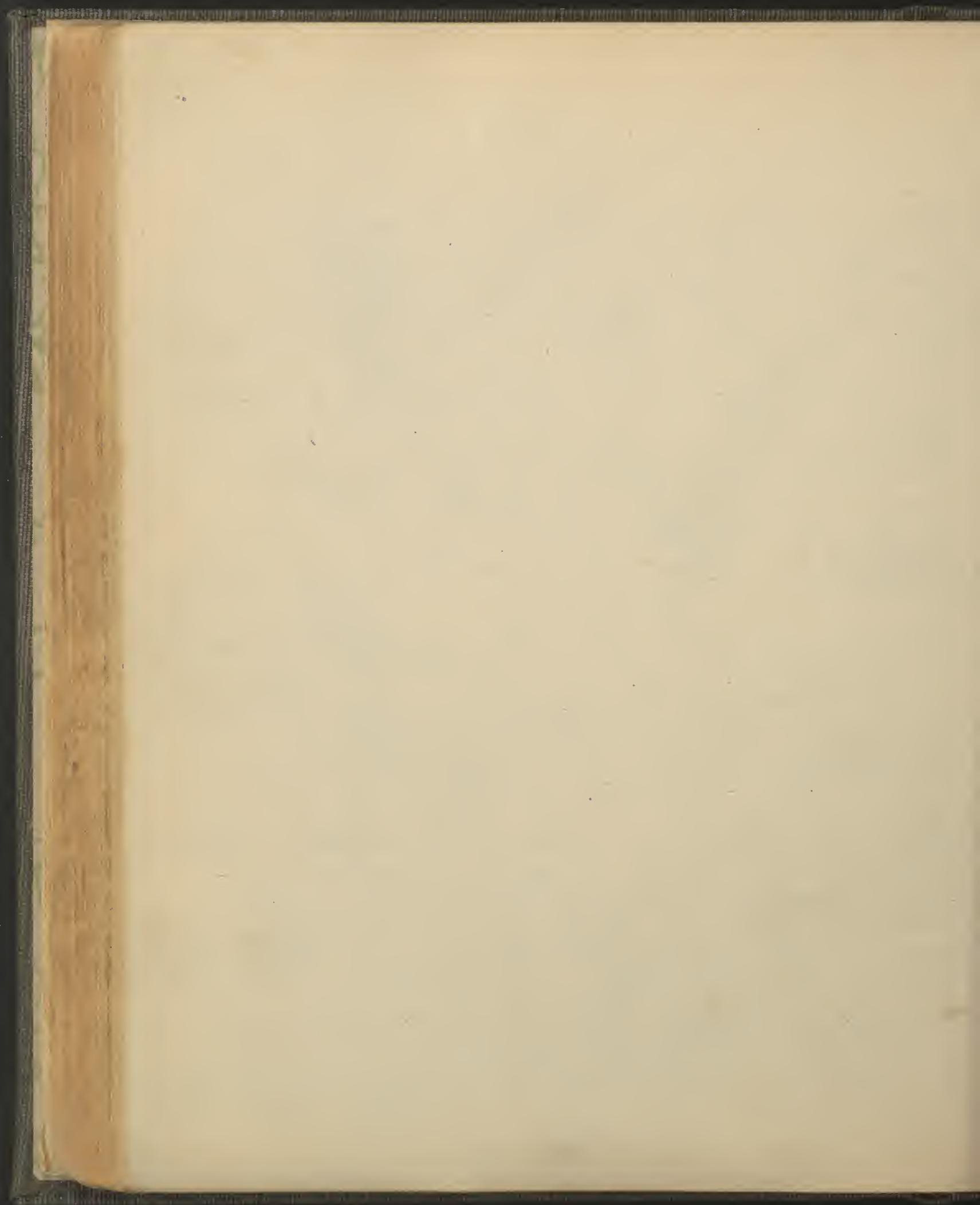
Each seminal vesicle is a reservoir for the seminal fluid and is formed of a tube (size of a goose-quill) some 5-6 inches long coiled into an oblong mass lying on the under surface of the base of the bladder,

Buty requires the base to be where the peribronchovascular interstitium is located by blood.

its large end projecting backward and outward from its fellow, the small end being in front just behind the prostate gland and approaching its fellow. Drawing a line from the posterior extremity of one vesicle to the other, which are about two inches apart, there is formed a triangular space which is seen to be devoid of peritoneum which extends no farther than the line above designated forming the base of the triangle the apex is at the posterior edge of the prostate gland and the sides are formed by the diverging vesicles and by a small tube which is seen passing along the inner side of each vesicle this is the vas deferens conveying the semen from the testicle.

- Vas Deferens -

Commencing at the upper extremity of the testicle the vas deferens forms one element of the spermatic cord the others being blood vessels, nerves &c which ascend to the upper border of the pubes where the cord plunges into the anterior wall of the abdomen (external abdominal ring) and then turns outward for two inches in the substance of the wall (inguinal canal) and then turns backward to enter the cavity of the abdomen (through an opening called the internal abdominal ring, as soon as the cord has entered the abdomen its various constituents disperse in different directions; the vas deferens passes to the upper part of the side of the bladder thence down the posterior surface of the bladder thence along the inner edge of the seminal vesicle at the anterior extremity of which the vas deferens is seen to be joined by the tube whose convolutions form the



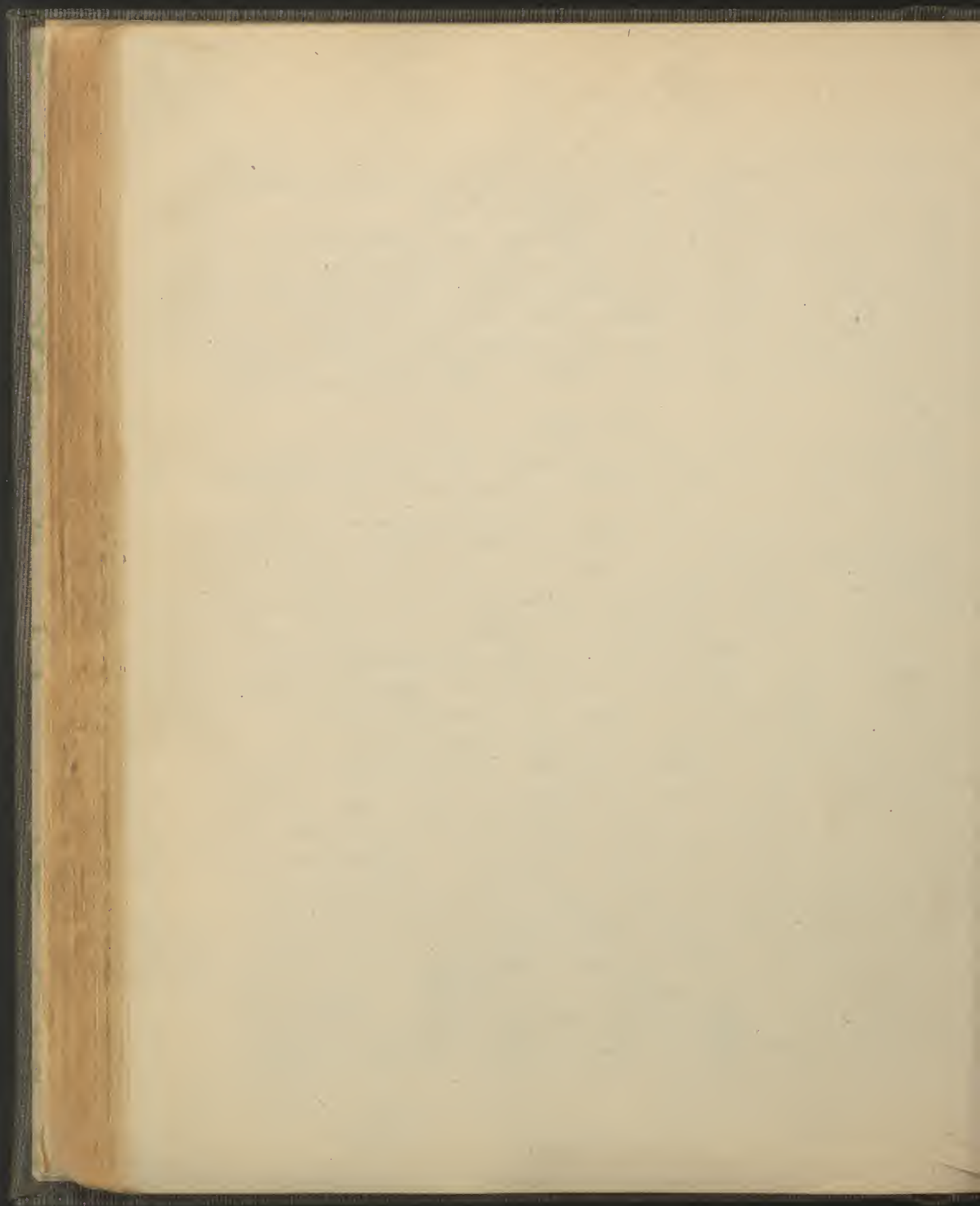
seminal vesicle and the duct thus formed is called

- The Ejaculatory Duct.

The two ejaculatory ducts lying very near one another pass forward and upward for about $\frac{3}{4}$ inch through the substance of the prostate gland to open on the sides of the aperture of the sinus prostaticus which is found at the base of the front of the corpus montanum on the floor of the urethra, its prostatic portion.

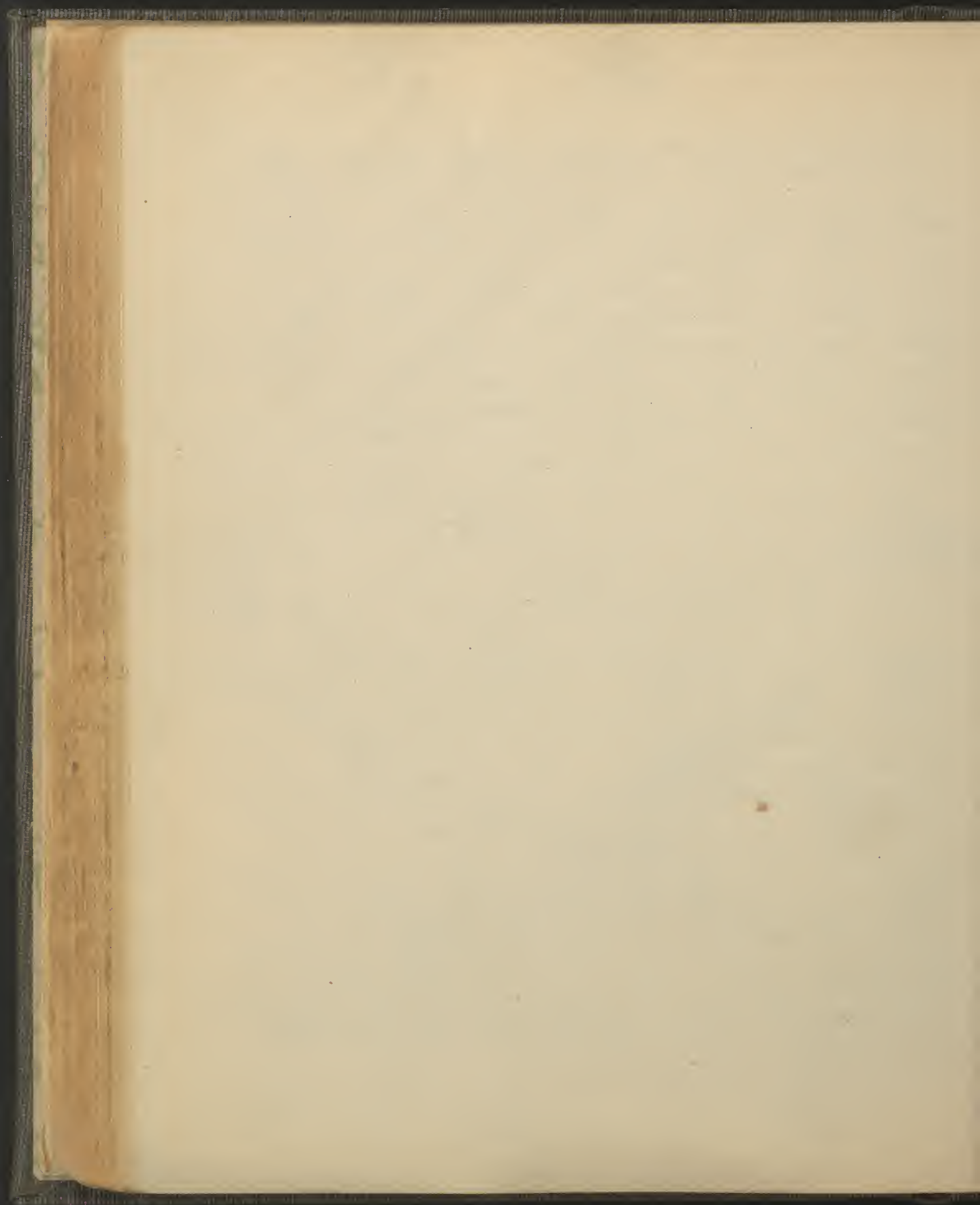
- The Penis.

The penis consists of three cylinders, two of them lying side by side are called the corpora cavernosa - the third is known as the corpus spongiosum which lies below in the groove between these. When dissected out the corpora cavernosa are seen to commence by attachment to the bone (rami of pubes ischium) this attached portion of each corpus cavernosum is called the crus which terminates posteriorly in a pointed extremity and increases in size forward to become (from) the corpus cavernosum, which does not extend to the extremity of the penis but stops short some little distance behind the meatus urinarius. The corpus spongiosum begins by a dilated portion called the bulb, situated between the crura, into which the membranous urethra terminates by becoming the sponge portion. The corpus spongiosum passes forward, tunneled by the urethra, and lying in the groove below the corpora cavernosa until it reaches the anterior extremity of these when it suddenly dilates into a considerable mass which covers the extremity of the corpora cavernosa and projects in a ridge beyond them. This dilated extrem-



ity is called the glans penis or head, the glans presents its base backward which terminates by a rounded edge raised above the surface of the corpora cavernosa this ridge being called the corona glandis and the seemingly restricted portion behind it is called the neck; from the corona the gland slopes to its termination around the meatus urinarius. That portion of the penis extending from the crura, or rather from the point where the three cylinders come into close relation, forward to the head is called the body of the organ; and the two crura (and the bulb) constitute the roof of the penis.

Surrounding and loosely adherent to the body is a thin skin which in front is formed into a fold, movable over the glans, called the prepuce; on the under aspect of the glans the prepuce is attached by a process extending forward to the meatus urinarius, this attached portion is called the frenum. Passing through the corpus spongiosum from the bulb behind to the meatus urinarius is the spongy portion of the urethra, which just before its termination at the meatus urinarius presents a considerable dilatation called the fovea navicularis. The mucous membrane lining the urethra presents many mucous follicles called lacinae opening into the canal, (when the membrane reaches the meatus urinarius it is continued over the glans penis and the under surface of the prepuce). The structure of the cylinders of which the penis is formed, is that known as erectile tissue - each is enveloped by a strong fibrous sheath that of the corpus spongiosum being more delicate than the others - within this the structure



consists of interlacing bands of fibrous tissue the interspaces between which contain dilated blood vessels which are capable of becoming turgid with blood to produce erection. The two corpora cavernosa at the posterior part of the body of the organ are separated some little distance from each other but as they pass forward they come much closer together for the fibrous partition between them is thick posteriorly whereas in front it is thin and presents numerous slit-like interruptions which have obtained first the name of septum pectiniforme (pecten - a comb)

- The Testicles - Testes -

The testicles are a pair of small organs whose function it is to secrete the semen; they are found suspended by the spermatic cord (see "Vas deferens") in the bag called the scrotum lying side by side though separated from each other. Each testis weighs from three-quarters to an ounce or more its length from an inch to an inch and a half, its antero-posterior measurement about an inch and a half and its transverse about half an inch. It occupies the back part of the scrotum and its position is oblique being from above downward and backward.

The Scrotum in which lie the testicle is thus constituted, 1st an external covering of skin. 2^d beneath this a musculo-fibrous covering called the dartos.

3^d lining the interior of the dartos and also enveloping the testis is a serous membrane called the tunica vaginalis, that portion of which lines the dartos is called the parietal layer and that enveloping the testis the visceral layer.



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There are indeed two tunica vaginalis, for the cavity of the scrotum is divided into two apartments, in each of which lies a testis invested by the tunica vaginalis of its apartment and this division is effected by means of a septum furnished by the duct called the septum scroti.

- The Structure of the Testicle -

Dissecting up the visceral layer of the tunica vaginalis beneath is seen a bluish white fibrous investment of the testicle called the tunica albuginea, which is found to be much thicker at its back part and this thickened portion is called the mediastinum.

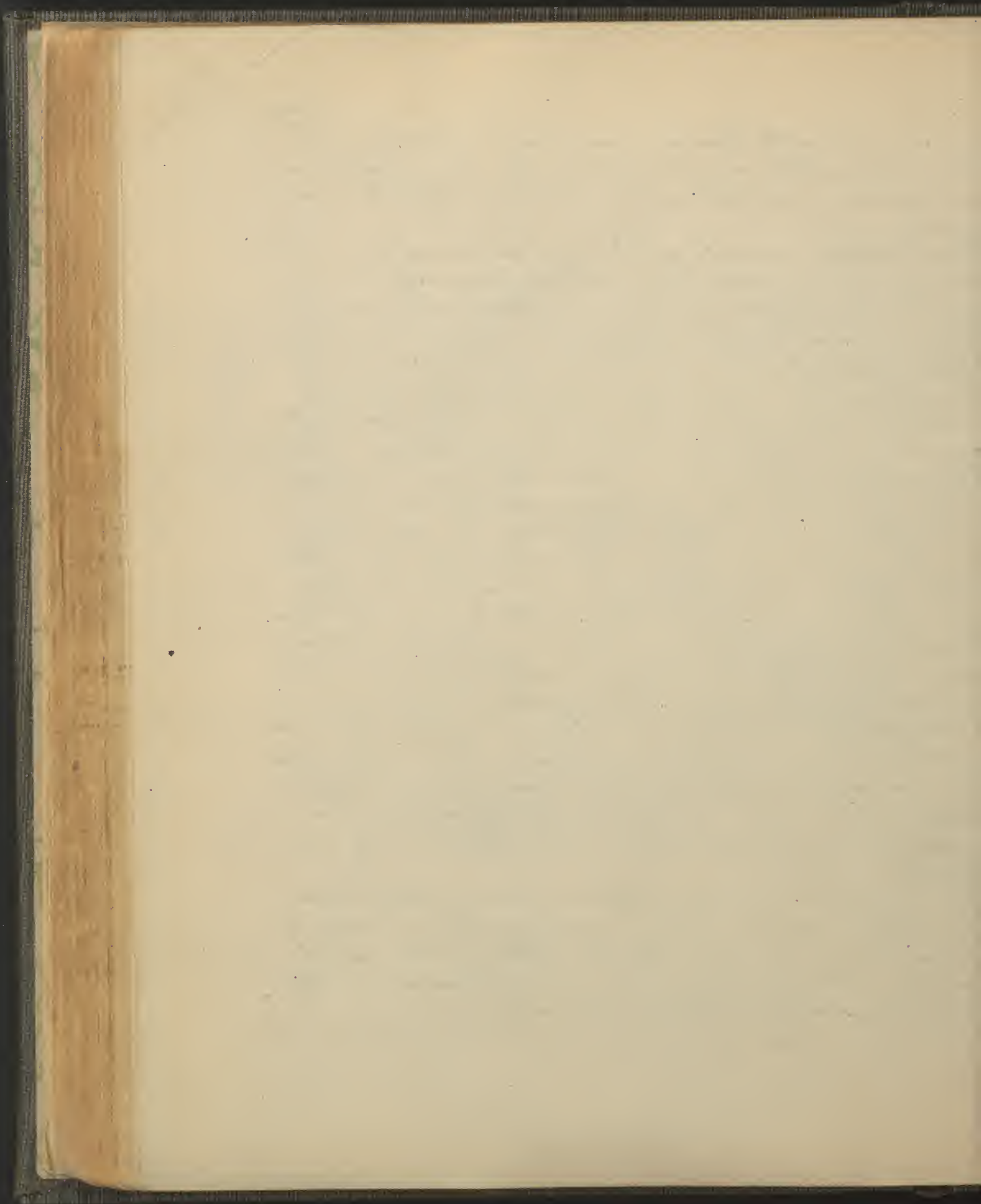
Lining the inner aspect of the tunica albuginea is a reddish vascular investment called the tunica vasculosa. Lying on the posterior aspect of the testis is seen a flattened body called the epididymis which is composed of the convolutions of the tube conveying away the semen, the upper portion of the epididymis is alone permanently connected with the testis for it is here that the ducts emerge which transmit the semen from the testis and unite to form the epididymis; this upper portion of the epididymis is called the globus major, its lower portion the globus minor which terminates in the vas deferens; the intermediate portion is known as the body. The semen is secreted in what are known as the lobules of the testicle, these number from 250-400, each lobule being separated from adjacent lobules by septa sent in between them from the tunica albuginea which septum however is covered on both sides



ing layer from the tunica vasculosa, so that one lobule is separated from another by two layers of tunica vasculosa and between these a layer of tunica albuginea.

Each lobule consists of the convolutions of a small tube $\frac{1}{20}$ inch in diameter (tubules seminiferus), arranged from before backward with the large end of the convoluted mass in front, the small end behind, at the mediastinum and here many lobules unite to form one duct which being comparatively straight is called a vas rectum, there being in the whole testis some 20-25 of these vasa recta, which plunge into the mediastinum and there unite into from 7-13 ducts, which ascending through the mediastinum in a sinuous course are called collectively the rete testis. When the ducts which form the rete testis have reached the upper extremity of the mediastinum they terminate in from 9-30 other ducts called the vasa efferentia, each of which is thrown into convolutions assuming a cornical appearance, these are known as the corni vasculosi which form the globus major or beginning of the epididymis; the bases of the corni terminate in larger ducts and these unite in the body of the epididymis into one duct whose convolutions (nearly 20 ft long) constitutes the body and globus minor of the epididymis and then become the vas deferens.

The continuous route of the sperm is thus seen to be lobule (which may be composed of as many as 3 tubes) 2^d vasa recta - 3^d Rete testis - 4th vasa efferentia - 5th corni vasculosi - 6th Epididymis body and globus minor) 7th vas deferens.



The Aerial Apparatus-

The air reaches the lungs from the throat through a tube which has received different names in its various parts. First it is called the larynx then trachea which divides into two bronchi opposite the 5th Dorsal vertebra.

The Larynx-

The larynx is formed upon a framework of separate cartilages which require to be studied under their individual names which they have received.

Thyroid Cartilage-

The thyroid is the upper front largest cartilage of the larynx; in front coming to an acute angle it produces the prominence called Adams apple; from this acute or receding angle it passes backward and outward on either side in a quadrilateral plate called an ala of the thyroid cartilage; on the outer surface of this quadrilateral ala is seen an oblique ridge from above downward and forward, terminated at each end by a prominence or tubercle; the posterior border is rounded and free and is prolonged both above and below into a process called superior and inferior cornu, each terminated by a tubercle the superior being the longer; the upper border is sinuous commencing in a notch at the receding angle it passes backward to become continuous with the superior cornu; the inferior border is also sinuous and continuous with the inferior cornu.

Cricoid Cartilage-

The cricoid cartilage is a ring and lies supporting

mt surf-
ant L
ack surf
" L

the thyroid cartilage between whose inferior cornua it is grasped. It is narrow in front not more than $\frac{1}{2}$ in deep whereas it becomes a full inch in depth behind; its upper border slopes upward and backward, presenting in the centre, behind, a slight notch and on either side of this an articular facet on which is perched another cartilage the arytenoid. running down the middle line behind is a ridge and on either side of this a slight depression and further forward on the side of the cartilage appears a rounded articular facet on which plays the inferior cornu of the thyroid cartilage.

- Arytenoid Cartilages.

The arytenoid cartilages are found upon the cricoid occupying the articular facets seen on its upper border on the sides of the notch in its centre posteriorly.

The arytenoid cartilage is triangular, its base below and apex above, its posterior curl. It is concave, and its ~~anterior~~ ^{external} border equally convex; its inner face, which looks towards its fellow narrow and flat; its apex is surrounded by a small separate cartilage called cricoid cartilage. The two arytenoid cartilages occupy the interval between the posterior borders of the alae of the thyroid cartilage.

Epiglottis

The epiglottis lies just above the receding angle of the thyroid cartilage. It is leaf shaped, its apex downward and forward and its base which presents a slight notch upward and backward, and by means of the base of the tongue its upper end may be sometimes

The entire Thyroid Membrane.

seen by looking down the throat.

These several cartilages are held together and to the tongue and hyoid bone by the following ligaments. The hyoid bone lies just above the superior border of the thyroid cartilage and passing between them is an unbroken membrane called the thyro-hyoid membrane and in each of the posterior edges of this membrane is a round cord which passes from the superior cornu of the thyroid cartilage to the posterior extremity of the hyoid bone and is called the thyro-hyoid ligament.

The thyroid and cricoid cartilages are held together by the following ligaments - The extremity of each inferior cornu of the thyroid cartilage is held to the facet on the side of the cricoid by means of a capsular ligament.

The considerable interval which exists in front between the lower border of the thyroid and the upper border of the cricoid is closed in by a fan-shaped yellow elastic membrane called the crico-thyroid membrane which is attached below to the superior border of the cricoid and above to the lower border of the thyroid (its inner edge).

Passing now to the epiglottis we find the apex of it held to the receding angle of the thyroid by a narrow ligament called thyro-epiglottic -

It is connected to the hyoid bone by a ligament called the hyo-epiglottic (attached to the epiglottis on its front aspect near its apex).

The back of the tongue and the epiglottis are connected by three ligaments one in the centre and one on each side called glosso-epiglottic (middle and lateral).

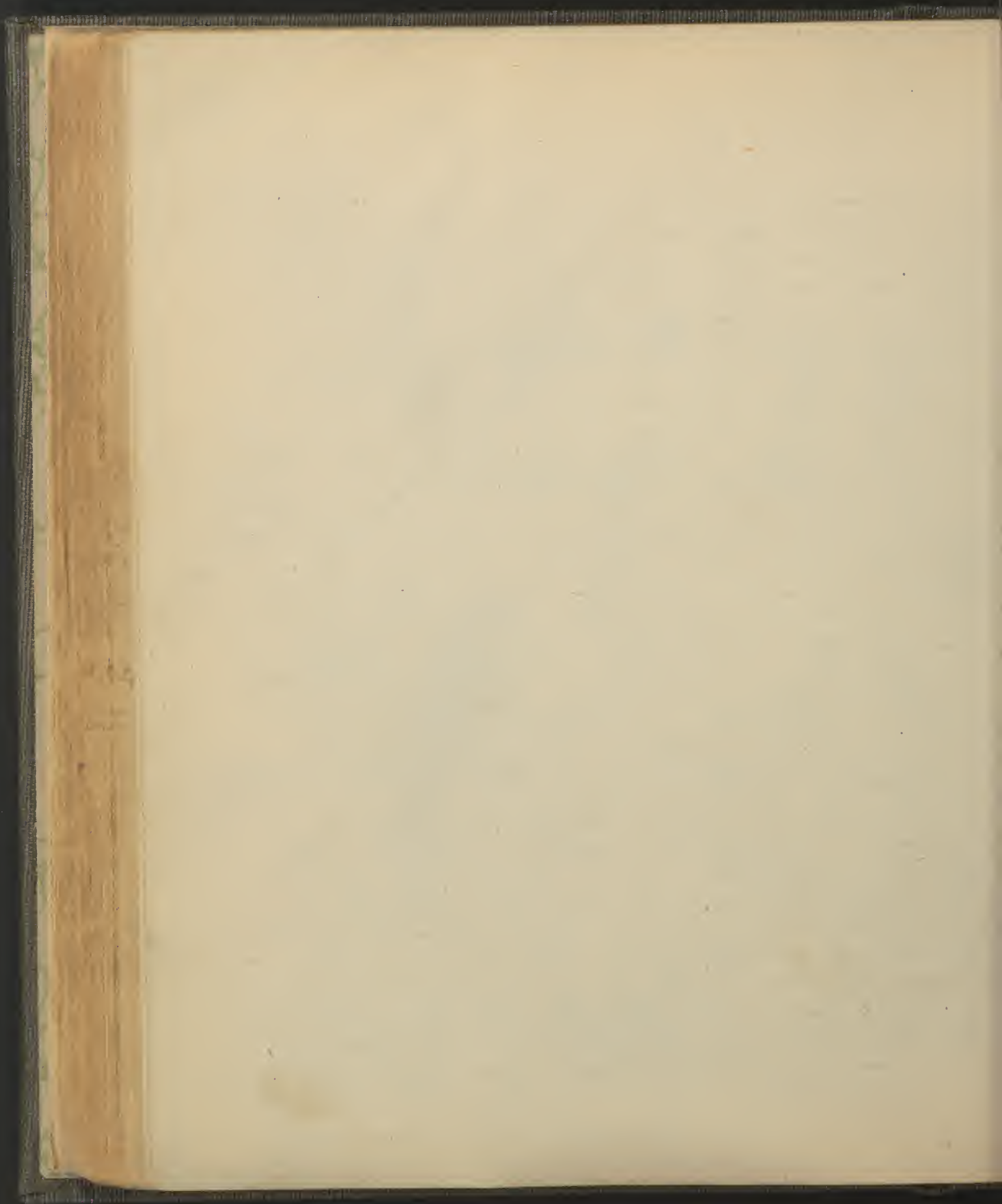
Lastly we have the ligaments attached to the Ary-

The false record cards are about the same overland.



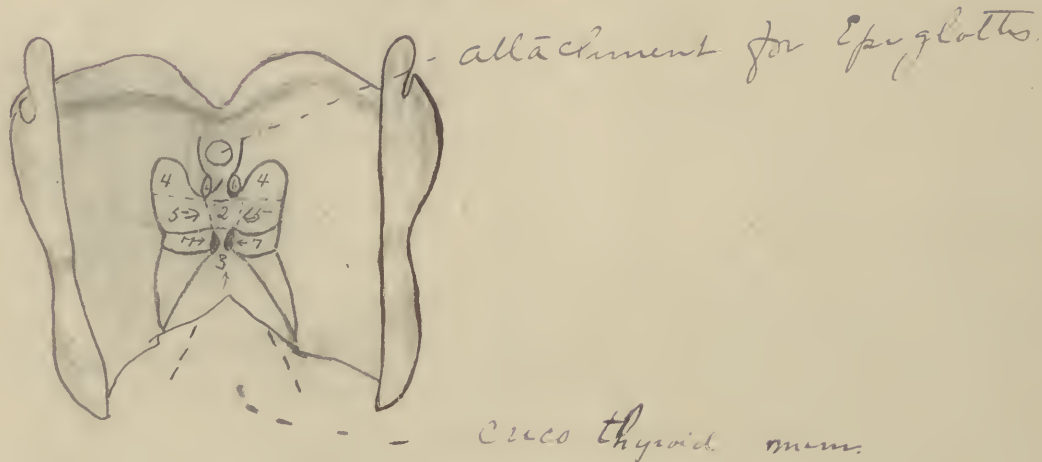
larynx cartilages; the base of each is held to the cricoid by a capsular ligament and the anterior part of this capsular ligament is much thickened and is called the anterior crico-arytenoid ligament. Besides these the arytenoid cartilage is connected to the receding angle of the thyroïd cartilage by means of two long ligaments. They are attached behind to the base of the arytenoid one above the other and in front to the receding angle of the thyroïd the upper one is called the superior thyro-arytenoid ligament (and with its fellow constitutes the true vocal chords.)

The larynx is lined by mucous membrane continuous with that of the mouth. Looking into the cavity of the larynx from below, at a certain point the cavity is seen to be suddenly narrowed by two ridges one on each side running from before where they are close together, backward and diverging as they go and leaving a triangular interval between them called the chink of the glottis or rima glottidis. These ridges are produced by the inferior thyro-arytenoid ligaments, or true vocal chords. Now reversing the larynx and looking into its cavity from above it is seen that the opening into it from the throat (Pharynx) is limited in front by the epiglottis which projects upward and backward; over the opening posteriorly, are seen the arytenoid cartilages laterally are folds of mucous membrane; the ventricular bands; the opening is heart-shaped - the front being the broad end down in the cavity are seen two ridges on each side one above the other, the lower pair, are the two which were seen from below - the upper pair correspond to the superior thyro-arytenoid lig-



aments and as the false vocal chords being much less prominent than the true vocal chords they could not be seen when the cavity of the larynx was viewed from below; the space between the false vocal chords bears no name, but from this nameless interval to the annular but smaller interval between the true vocal chords the *rima glottidis*, is known. On each side of the glottis is another space formed by the recession of the wall of the larynx between the true and false vocal chords which is called the ventricle of the larynx and this ventricle is continued up on the outside of the false vocal chord between it and the wall of the larynx some little distance and this prolongation of its cavity is known as the *sacculus laryngis*. (To get a definite idea of the ventricle and glottis consider them as having the following boundaries. The ventricle is bounded on the outer side by the wall of the larynx (ala of the thyroid) and the inner side is the space called the glottis, above is the false vocal chords and the *sacculus laryngis* below is the true vocal chord. The glottis is bounded above by the nameless interval between the false vocal chords, below by the *rima glottidis*; on each side by the ventricle; for it lies between the two ventricles, each ventricle extending from the wall of the larynx towards the centre only as far as an imaginary line passing from the inner edge of the false to the inner edge of the true vocal chord.

(1) *larynx*
Anterior



Relat.
 Arises opp. 5th cer. vertebra - same level of cucurbit.
 Trachea down on ventral side - into larynx - - - - -
 the 1st bronch. opp. 4th cerv. v.

In front - 2 columns of thyroid gland. 2.5 cm.

(2) S. Thy. & S. Thy. v.

3. Cervical fascia

(4) Superficial fascia. (5) Deep fascia. (6) Thyroid gland.

(7) 1st bronch. (8) 1st aortic arch of man.

(6) Larynx is separated from it by a small
 space.

Behind - oesophagus -

on each side the thyroid gland - (2) Rec. larynx
 & Thy. art.

Trachea

In front. (1) sternum - S. Thy. & S. Thy. v. - - - - -
 (2) aorta - lies in front. & left side of
 trachea - - - - -

1. Samelous interval between false vocal chords.
2. Glottis.
3. Prima Glottidis 4 Sacculus Laryngis.
5. Ventricle. 6 False vocal chord.
7. True vocal chords.



- Trachea -

Succeeding the larynx comes the second subdivision of the air-tube known as the trachea; commencing where the larynx terminates opposite the fifth cervical vertebra it descends in front of the vertebral column from which it is separated by the oesophagus, and it terminates by forking opposite the third dorsal vertebra into the right and left bronchi.

It is a cylindrical tube flattened on its posterior aspect, about 4-5 ^{5 1/2} inches long and about 1 inch in diameter these dimensions being somewhat less for the female. Its appearance when viewed from the front is annular due to the fact that its largest element is a number (15-20) of cartilaginous rings one lying below the other; the flattening of the trachea posteriorly is due to the fact that each cartilaginous ring is wanting in its posterior third, thus leaving this portion of the tracheal wall devoid of a cartilaginous element; these rings are not in contact but are slightly separated and maintained in position at the same time by a fibro-elastic membrane which covers both surfaces of the rings for these in fact lie imbedded in the substance of the membrane; between the posterior extremities of the rings, over the interval left by their imperfection, the membrane is continued

Left side left side & in front

it is stronger. acts at right angles to it.
" is Right hand. - The left hand is
not in use in it.

Hand - sleepers.

Two riders but not at the same time of day
- one is left - left 2 in at in -

larger.

Hand - of Bunchi - Act it. many.

2 - end of water.

and here the portion between the posterior extremities of the rings, it is strengthened by interlaced muscular fibres both longitudinal and transverse, the longitudinal are unimportant but the transverse passing between the posterior extremities of the rings can by their contraction diminish the diameter of the trachea.

The interior of the trachea is lined by mucous membrane, continuous with that of the larynx above and prolonged below into the bronchi, bronchial tubes and ultimate air-cells of the lungs. Beneath the mucous membrane, between it and the fibro-elastic membrane, containing the rings, is a yellow-elastic membrane which is much more distinct posteriorly where the fibres which compose it are gathered into longitudinal bundles. To sum up its structure we say the trachea is lined by mucous membrane, beneath this yellow elastic fibres, external to these is a fibro-elastic membrane lying in which are the characteristic imperfect cartilaginous rings; besides which are found transverse muscular fibres between the posterior extremities of the imperfect rings; and scattered around the tube some unimportant longitudinal muscular fibres.

Thyroid Gland.

Lying in relation with the upper part of the trachea and the larynx is a ductless gland called the Thyroid. It consists of two similar lobes, each about two inches long and $\frac{3}{4}$ inch in largest diameter, conical with its base below and apex

bet- Superior + Inferior Mediastinum
... Broad ligament of Pleural
bet- Valsalva identification

above. These two lobes lie one on each side of the upper part of the trachea, and are usually connected by a third portion of the gland called its isthmus, which is a narrow strip passing from the base of one lobe across the front of the 2^d & 3^d rings of the trachea to the base of the other lobe the apex of each lobe extending out beside the larynx. E

The color is a brownish red (and the gland weighs about $1\frac{1}{2}$ ounces) its size in the female undergoes increase at each menstrual period.

In structure the gland consists of numerous lobules which are made up of many vesicles containing a peculiar fluid, cells and nuclei; besides which is a thick network of blood vessels, for the gland is extremely vascular, each lobe receiving two large arteries one from above, and the other from below; its constituents are held together by areolar tissue which separates its lobules.

— Bronchi —

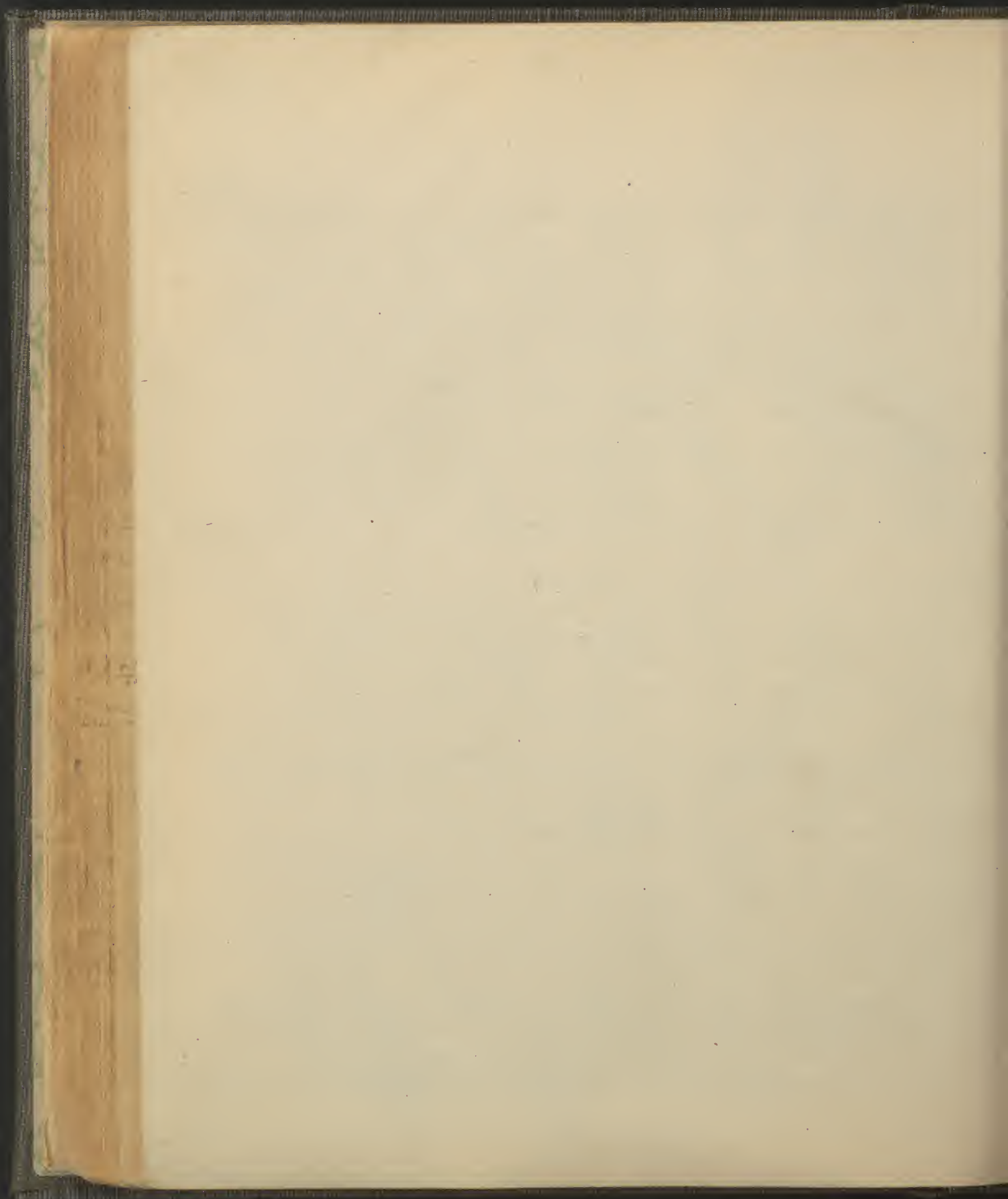
Taking up the air-tube again, we find that the trachea (or wind-pipe) when it has reached a point corresponding to the front of 5th Dorsal vertebra forks and the prongs of the fork are the right and the left bronchus, each of which extends from its origin to the inner surface of the lung, forming one of the elements of what is called the root of the lung. The bronchi are not circular and the difference between them may be thus stated, the Right is shorter, it is larger, it is more nearly horizontal, coming off nearly at right angles to the trachea, whereas the left has a considerable obli-

W.B. notch on anterior border left lung.

quity downward - If the trachea be cut across near its lower termination and the cavity be looked into, on its bottom is seen a slight ridge extending from above before backward and separating the commencement of the bronchi and this ridge is not exactly central but lies somewhat to the left; as that should a foreign body enter the trachea from above the chances are that it would fall to the right of this ridge and thus enter the right bronchus - In length the left bronchus is about two inches, the right about one inch. In structure they exactly resemble the trachea.

- Lungs -

The lungs are a pair of organs found in the thoracic cavity, one on each side of the middle line, having the heart enclosed in the pericardium between them and resting upon the diaphragm below - Each lung is conical in shape, its base is below resting on the convex upper surface of the diaphragm, it is here concave in correspondence to the shape of the surface on which it lies. Its apex is above extending into the root of the neck (some $1\frac{1}{2}$ inches). Besides the base and apex, each lung presents the following subdivisions, the posterior border is long, thick and rounded and contracts obviously with the Anterior border which is thin, short and sharp; the surfaces are two, the outer surface is convex to correspond to the inner concave surface of the chest wall against which it lies; the inner surface which looks towards its fellow is concave and the concavity is caused by the heart in

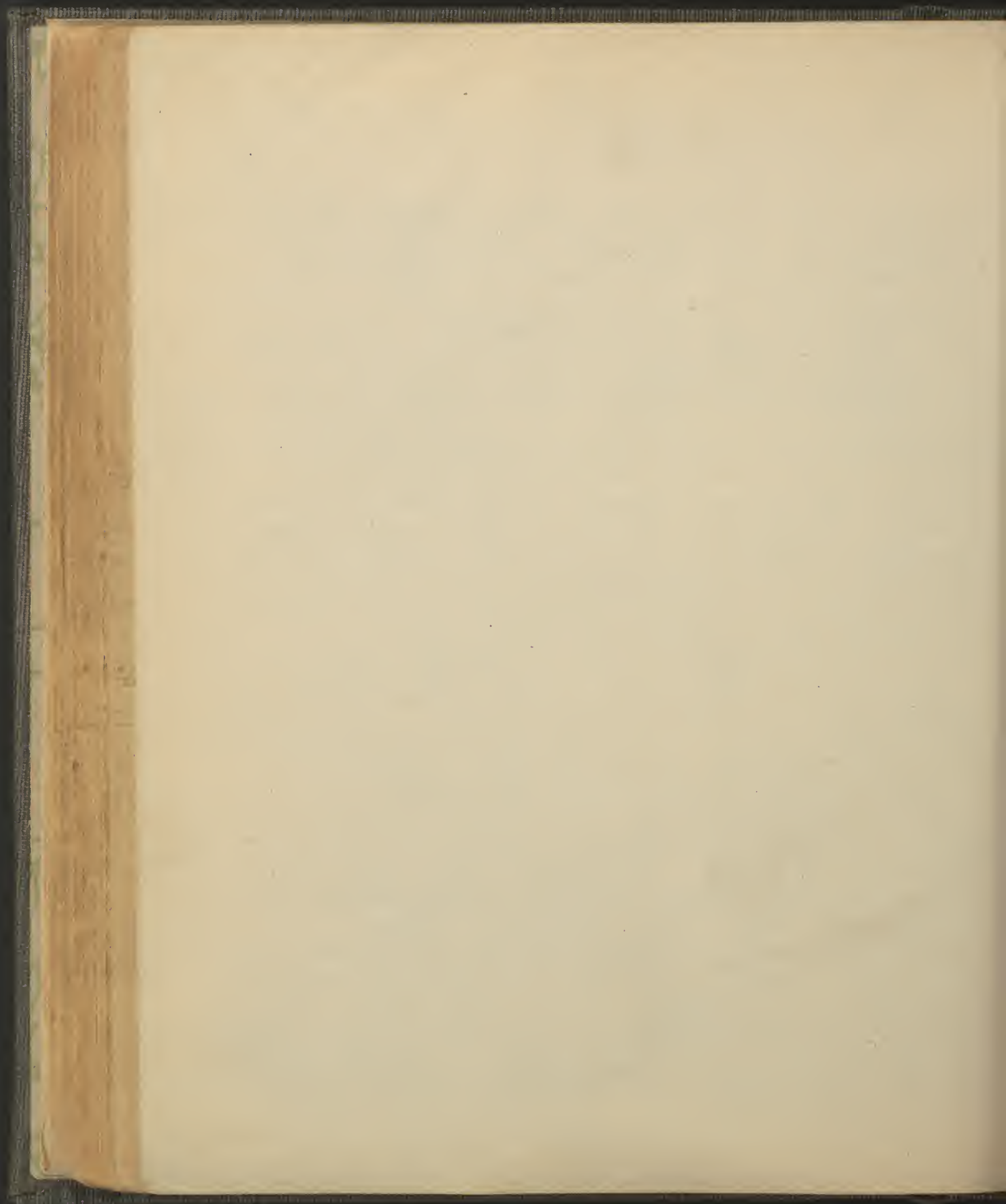


its pericardium which lies between the two lungs, it being placed on the centre of the upper surface of the diaphragm; the inner surface of the left lung is much more concave owing to the considerable inclination of the heart to the left. Nearly in the centre (a little above and posterior to it) of the inner surface of each lung the root of the lung is seen to enter its substance, the root consists of various elements as nerves lymphatic and the bronchial arteries, but its chief are the bronchus, - the pulmonary artery bringing venous blood from the heart and the two pulmonary veins carrying back this venous blood arterialized. - The relations which these bear to one another are same for each lung in the direction from before backward but are different for the two lungs from above downward.

From behind forward then in both roots the position is Bronchus, Artery, veins - (This position of the bronchus might be inferred from a consideration of the relation which the termination of the trachea bears to the heart, the bifurcation

taking place behind the heart from which the other two elements of the root under consideration proceed). The relation from above downward is in the Right Root, Bronchus, Artery Veins. in the left Root, Artery, Bronchus, veins -

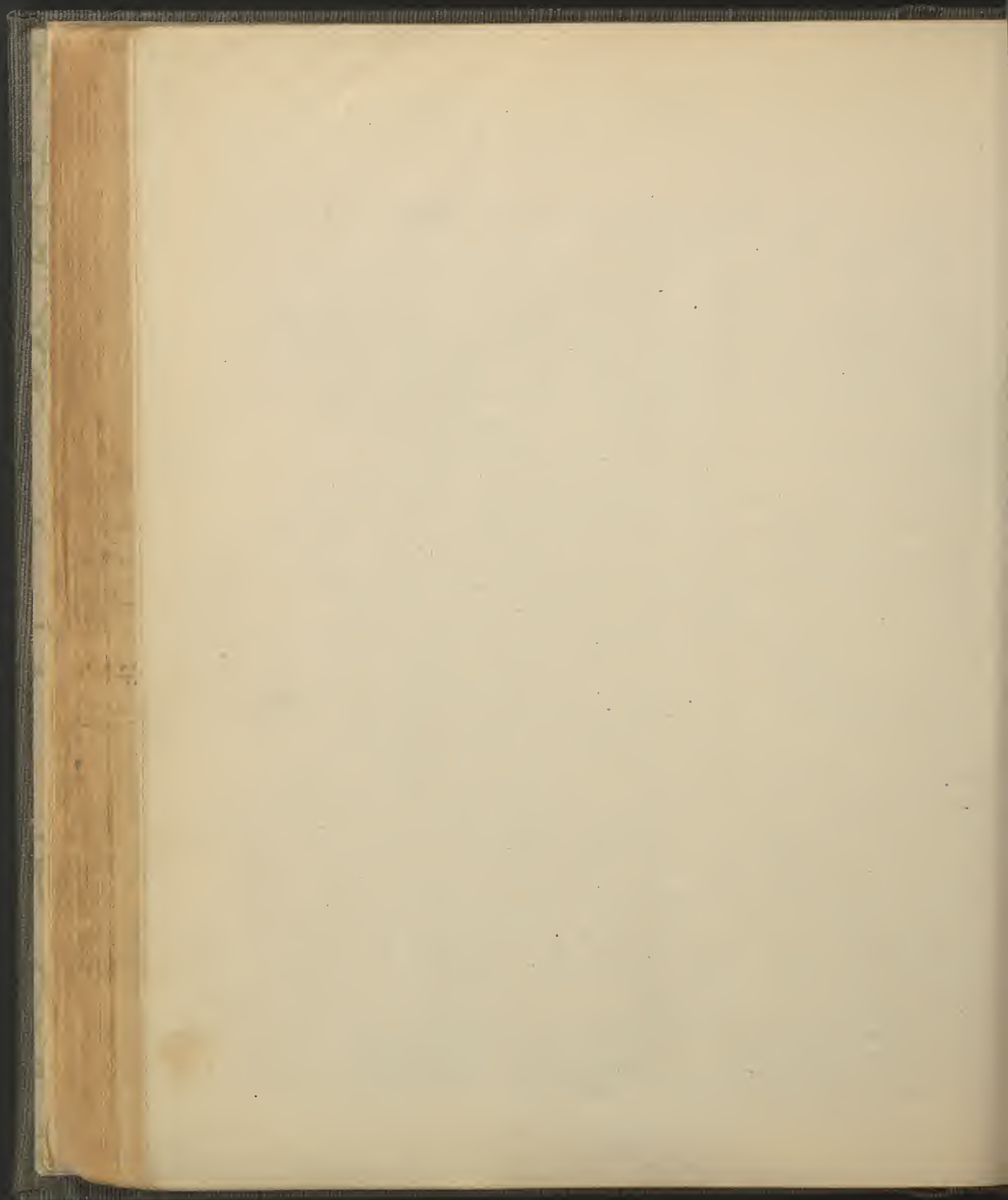
The veins are then seen to be the lowest on both sides, the difference between the two roots, being produced by a change of relation between the artery and bronchus in the left lung and this is accounted for by the downward inclination and the greater length of the bronchus on the left side.



(By making the statement as above it is seen that by stating this relation

Bronchus, Artery, Veins, you give not only the relation from behind, forward of both roots but also the relation from above downward of the Right Root, and the deviation from this in the left root is easily remembered from the fact that the left bronchus is long enough and has a sufficient downward inclination to get below the artery.)

Each lung is divided by fissures into lobes, the right lung into three and the left into two, commencing about 3 inches from the apex on the posterior border of each lung an oblique fissure passes through the lung downward and forward to near the lower extremity of the anterior border - Now in the right lung there is another fissure which begins about the centre of the oblique fissure and runs nearly horizontally forward to the anterior border thus dividing the right lung into three lobes; these lobes are called upper, middle and lower, on the left lung as there is no horizontal fissure there are but two lobes an upper and a lower - Now although the right lung is slightly larger than the left, this is not due to its having three lobes which are only the result of an additional fissure, the difference is due to the encroachment of the heart on the left lung, this difference however is again reduced by the fact that the right lobe of the liver lies on the right side and being much thicker than the left lobe it bulges the diaphragm upward more on that side thus rendering the right lung shorter than the left so that the difference in weight is

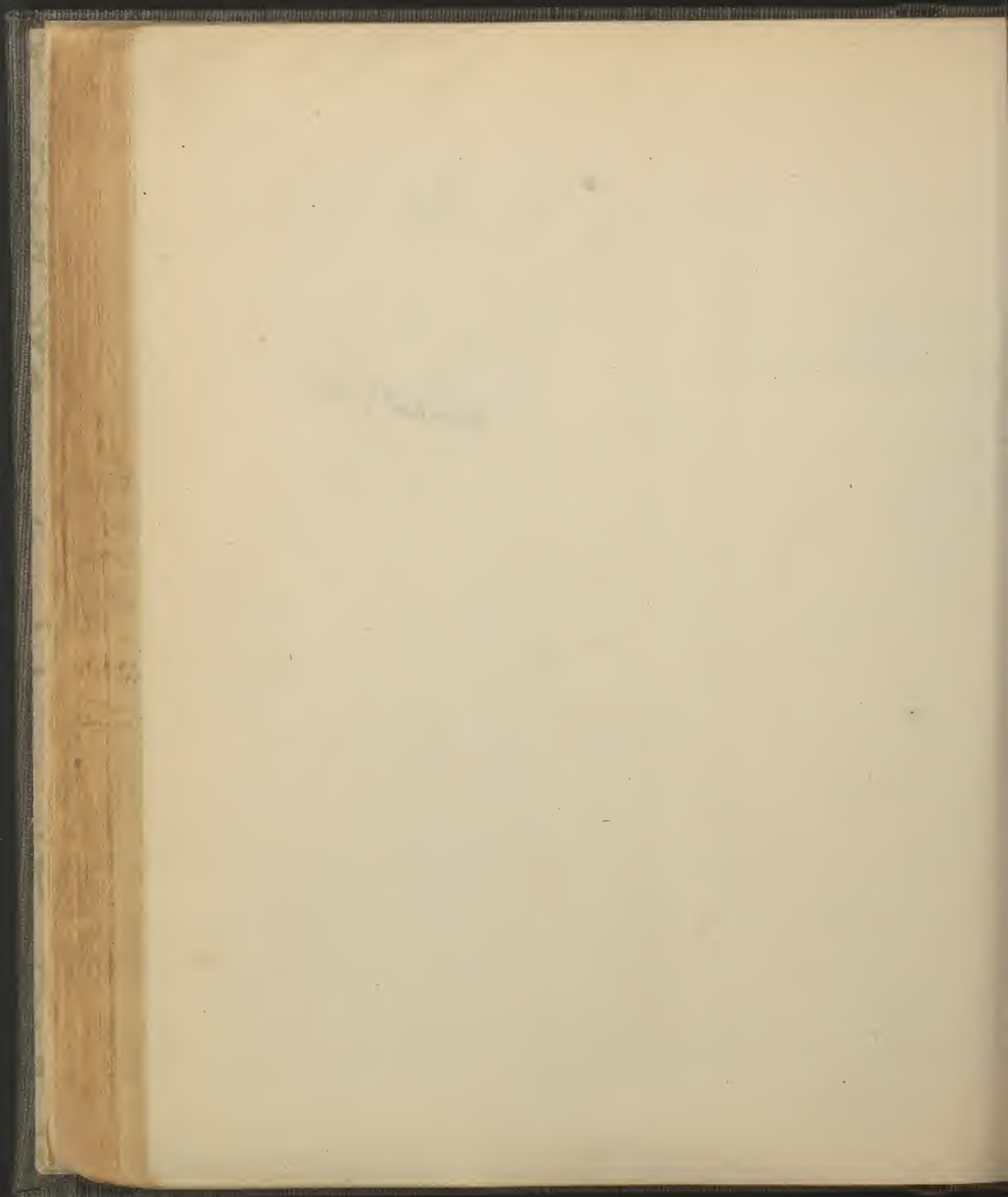


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reduced to about two ounces, the right lung weighing 22 ounces and the left 20 ounces.

III. Pleurae.

Enveloping each lung and lining the chest-wall is a closed membrane and on each side these membranes are the pleurae, each lung separate from the other and forming a distinct closed bag: one side of this closed bag lines the inner surface of the chest-wall and the other side invests the lung completely. In front behind the sternum the two pleurae approach each other closely and sometimes they are in contact about the center of the sternum. In tracing the continuity of the pleura as it is a closed sac we can begin at any point and following it will return to the same. Beginning then on the root of the lung in front, we will trace the layer which covers the lung called the visceral, or pleura pulmonalis and then the layer which lines the chest-wall called the parietal or pleura costalis, these being continuous with each other. From the front of the root of the lung the pleura passes forward on the inner face of the lung to its anterior border then it passes around the convex outer face of the lung to the posterior border and lastly it passes forward on the inner face of the lung to the back of the root of the lung where this visceral layer ceases and the parietal begins, which passes back from the posterior aspect of the root of the lung to the side of the vertebral column thence along the inner surface of chest-wall to the sternum in front where it leaves the chest-



wall and passes backward between the pericardium and visceral layer to the front of the root of the lung where it becomes continuous with the visceral layer which we have followed. - The free surfaces of the two layers of the pleura secrete a small amount of liquid which renders the movements of the lungs in respiration easy and noiseless. This being the object of the pleura.

Structure -

Each lung has an external serous coat - the pleura pulmonalis, beneath this is an areolar elastic investment which sends processes into the substance of the lung to separate it into numerous subdivisions called lobules where the function of the lung the aeration of the blood is effected.

As soon as the bronchus reaches the lungs it forks into bronchial tubes and these ramify throughout the lung continuously subdividing, generally by forking, until finally they open into the air-cells, which form the lobules, there being thousands of these small cells in each lobule (say 20000), every lobule having one bronchial tube. On the walls of these cells ramify the blood vessels, these walls separating adjacent cells (which open into a kind of common cavity called an inter-cellular space with which the bronchial tube communicates). The Bronchial tubes differ in their structure from the bronchus, at first the only difference is that the cartilages cease to be ring shape and are flat scale-like and scattered all round the tube; towards the termination of the tube the

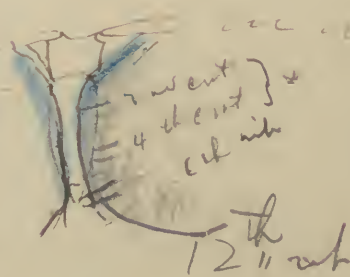
Some of the pleura is to upper
 extent of 1st rib behind it is lying
 beside the body of 7th cervical
 vertebra.

Superior Mediastinum See Gray 934

(92) ~~the same as~~ ~~sup. one~~ ~~in addition~~ to what is noted

The ant mediastinum is a little to the left
 of median line. ∴ its ant border would
 be in part the post border of the ribs.

The pleura come with in chest of
 each other (10) from outer $\frac{2}{3}$ of arch.



area of the
 ant mediastinum

* Please all meet here

on left side only as far down as 6th

cartilages disappear entirely and the tube consists altogether of fibrous tissue (in which are many elastic fibres), muscular fibres and mucous membrane - (the diameter of the smallest tubes is from $\frac{50}{1000}$ - $\frac{30}{1000}$ of an inch of the air-cells from $\frac{200}{1000}$ - $\frac{70}{1000}$ of an inch.)

Before birth the lungs are almost colorless, but as soon as the blood reaches the walls of the air-cells, the lung assumes a pink color, which gradually fades during life to a slate color, this may assume an almost black hue in the decline of life, especially in men and in the posterior part of the lung, owing to the deposition of minute particles of carbon.

Not O.K. See Gray p 933

Mediastinum - There exists between the inner surfaces of the two lungs or rather between the opposing surfaces of the two pleurae, a narrow interval extending from the back of the sternum in front to the vertebral column behind, this is known as the mediastinum, and is divided into three parts, anterior, middle and posterior mediastinum - The middle mediastinum is that space which the pericardium and heart occupy and is much the largest part of the mediastinum.

The Anterior mediastinum is the small space between the back of the sternum and the heart, this space is very small owing to the fact that the two lungs overlap the heart in front and approach each other very closely in front sometimes indeed they actually touch each other behind the centre of the sternum. It is also seen that the anterior

Panicum adhaerens to depth. Below and is almost
above to great res. among from the heart, all in

mediastinum is not perpendicular but is oblique from above downward and to the left as well as not only to have the sternum in front but also to some extent the costal cartilages below. The posterior mediastinum is the space between the Heart (pericardium) in front and the vertebral column behind.

- The Heart. See pa 131 note.

The heart is a hollow muscular organ found in the cavity of the chest lying between and almost surrounded by the two lungs, resting upon the centre of the convex upper thoracic surface of the diaphragm and occupying the space known as the middle mediastinum. It is concealed within a closed cavity formed by the pericardium, lying for the greater portion of its extent unattached; but since its function is to maintain the circulation of the blood, the vessels which bring this to it and carry it from it all communicate with the upper portion (base) of the heart and thus maintain its position; for the rest of its extent the heart pulsates free in the pericardium and to render its movements easy and noiseless a serous membrane is provided which like all other serous membranes is a short sac, one layer lining the inner surface of the pericardium (this is usually called the serous pericardium and the membrane it lines the fibrous pericardium), and the other layer wrapped around the heart from the origin of the vessels on one side to their origin on the other. The heart is conical in shape, its base is above and to the right, its apex below and to the left its length about 5 inches.
+ four in.

Position of Valves

Pulmonary { just to left of sternum
 { at junct of 3rd cost cart.

aortic { just to left of sternum
 { in 3rd intercostal
 space. behind $\frac{1}{2}$ in to left.

mitral { same as above only
 { an inch to right
 is to left of aortic &
 behind and little lower

Tricuspid { Just under center of
 { sternum between 4th
 { costal cart.

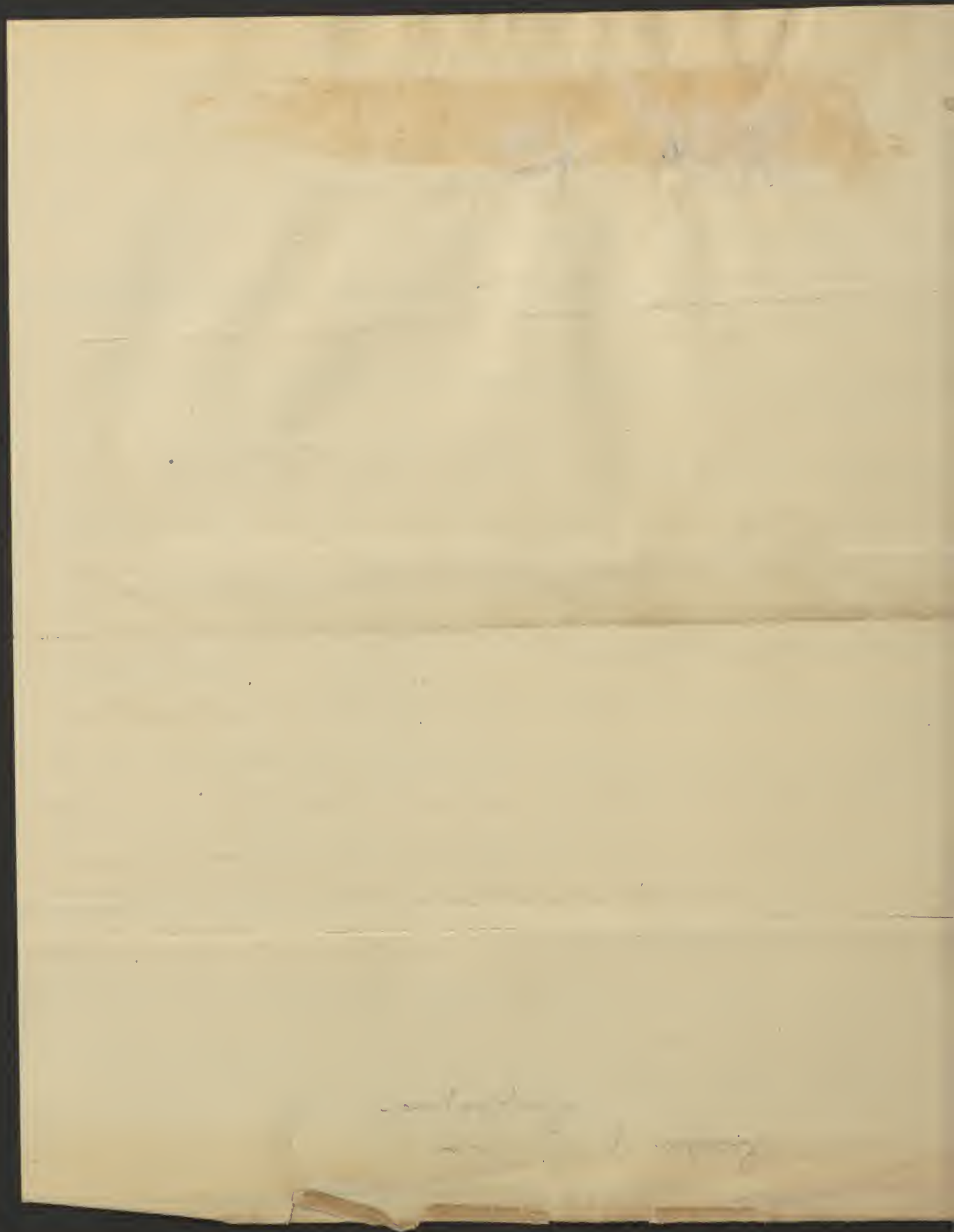
Depth from before back.

Valves

Depth from before backward
mitral is the deepest (most to left)
Pulmonary most superficial

Aortic this is between the two above and
a line drawn between the 2 above
would pass through its center

entrance Area of Praecordial dulness
It is due to notch in ant. border of left
lung & this corresponds to a space repres-
-ented by a circle whose diameter is 2 in
and whose center on a line drawn from
the left nipple to sterno. ?
Foules



long axis is drawn forward and to the left

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its transverse measurement about $3\frac{1}{2}$ inches, its antero-posterior about $2\frac{1}{2}$ inches: its weight varies in both sexes being rather larger in the male, from 9-12 ^{female} 10-12 ^{male} ounces.

The exact position of the heart is thus stated, the base lies behind the sternum corresponding to a line drawn between the upper borders of the extremities of the third costal cartilages and the apex is downward and to the left striking the chest-wall in pulsation at the interspace between the 5th and 6th ribs of the left side, 2 inches below and one inch within the left nipple. ^{3 ref. 10131 notes.}

The cavity of the heart is separated into a right and a left half or apartment by an obliquely vertical septum which cuts off all communication between the two halves. The position of this septum can be predicated by an inspection of the exterior of the heart, for here the line of its attachment to the wall of the heart is indicated by an obliquely vertical groove passing from the base anteriorly and towards its left aspect, downwards to the right of the apex to rise along the posterior face of the heart and terminate at the base towards its right aspect; lying in this groove, which, for a reason given hereafter is called interventricular, is an artery. From the position of the groove it is seen that the apex of the heart is formed entirely by the left half and that the front of the heart is formed mainly by the right half, while the back of the heart is the product principally of the left half.

When the heart is laid open its entire cavity is seen to be lined by a serous membrane (continued)

Substitute venous for right
Arty . . . left.

In the other portions of the heart except the str.
muscle the granular features are simple
bliss granular.

into the vessels which communicate with it) called the endocardium and that each lateral half is subdivided by a partial horizontal septum into two cavities the uppermost of these is called the auricle and the lower is called the ventricle, and to distinguish the cavities of the two sides they are known as right or left auricle or ventricle - The position of the horizontal septum is indicated externally by a groove passing around the heart horizontally and called auriculo-ventricular -

In the adult the venous blood of the entire body with the exception of that of the heart itself, is returned into the right auricle by two great veins called venae cavae, the one bringing the blood from the head and upper extremities is called the superior, the other bringing the blood from the lower extremities and body is much larger and called the inferior; the venous blood from the heart is returned into the right auricle by a separate vein called the coronary and just as this is about to enter the auricle it dilates and this part is called the coronary sinus -

Besides these channels for the return of the venous ^{system} blood, there exist numerous minute apertures into every (?) cavity of the heart thro which its venous blood may enter its cavity to a small extent; these are known as foramina Thebesii - The venous blood thus collected by the right auricle is driven by its pulsation into the right ventricle with which it communicates by an aperture, the right auriculo-ventricular, through the horizontal septum from the right ventricle the blood is sent into the pulmonary artery which soon divides into two branches, one to each lung.

Right Atrium.

Superior vena cava - upper breast vein.

inf. " " lower " "

between these the bulbul of lower
coronary Sinus

" Valve-

fossa ovalis between the 2 auricles

auricles " "

Eustachian valve - the ridge running from
the inferior v. cava to fossa ovalis -

Musculi pectinati -
forming the basis

Auricular appendix.

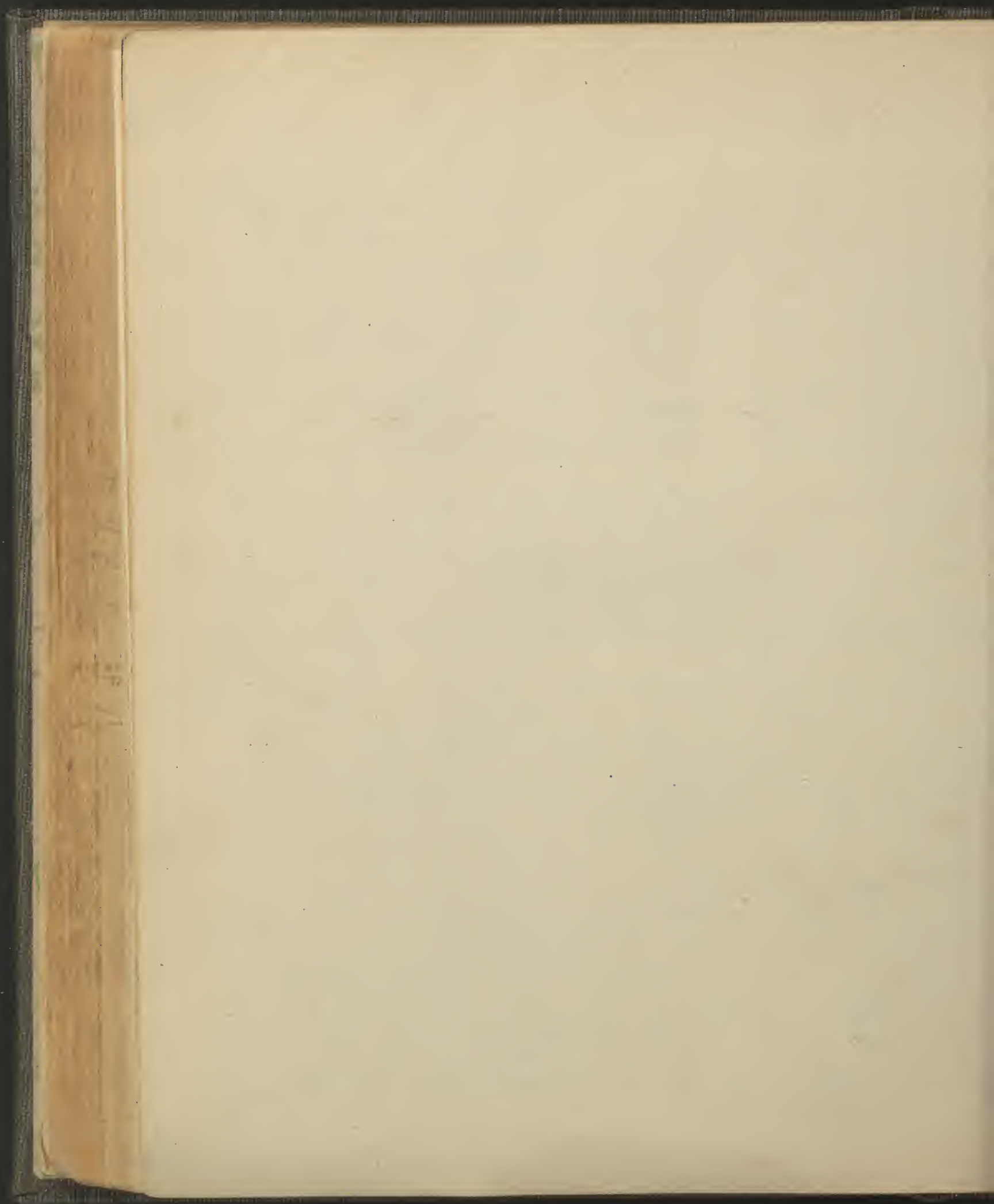
Taking up now the appearances seen on the cavities of the heart we begin with the right auricle.

The Right Auricle consists of two portions, the larger portion of its cavity being called the sinus but communicating with this and projecting forward is an ear-shaped addition called the appendix auricularis and hence the name of the auricle (this applies to both Auricles) - The sinus of the right auricle, presents the following objects, the opening of the superior vena cava at its upper back part, the opening of the inferior vena cava at its lower back part, and the portion of the auricular wall between these two openings is called the tubercle of Lower (tuberculum Lower). From the fact that the wall is thick here and sometimes presents a tubercle-like prominence the coronary sinus presents an opening guarded by a valve-like fold of endocardium and called the coronary valve; looking on the septum between the two auricles is seen an oval-shaped depression called the fossa ovalis and surrounding this, except below, a ridge called annulus ovalis; extending along the wall of the auricle from the opening of the inferior vena cava to the fossa ovalis is a ridge the remains of the Eustachian valve of the fetus; the lining membrane of the cavity is seen to be raised into ridges produced by little muscular columns called *musculi pectinati*; and lastly of course foramina Thebesii are found, and the opening into the ventricle right auriculo-ventricular. To sum up we have five openings. 1st Superior vena cava - 2^d Inferior vena cava - 3^d Coronary sinus - 4th Foramina Thebesii and 5th Auriculo-ventricular

Corda Tundinae
Columnae canalic

and six other appearances - 1st *Musculi pectinati*.
 2^d *Tubercle of Lown*. 3^d *coronary valve*. 4th *Crustacean valve*. 5th *Glossa oralis*. 6th *Anulus oralis*.

Right Ventricle has two openings communicating with it, one leading into the pulmonary artery and the other is the auriculo-ventricular - which is surrounded by a fibrous oval shaped ring and in order to prevent the blood's regurgitating into the auricle when the ventricle contracts, this opening is provided with a valvular arrangement, which consists of three segments each triangular attached by its base to the fibrous ring and freely by its apex, they being formed of folds of endocardium strengthened by fibrous tissue and perhaps muscular fibres. When the ventricle contracts the blood is insinuated itself behind these segments which when the ventricle is passive hang loose in its cavity and force them before it until they come together, their apices meeting in the centre of the opening, now these segments being quite flexible would be forced by the pressure of the blood up into the cavity of the auricle were it not that the following arrangement prevents this only allowing the valves to float far enough up to close the opening. Looking on the inner surface of the walls of the right ventricle is seen a number of ridges, muscular columns, which when examined are seen to consist of three kinds - 1st come from a mere ridge being attached to the wall of the ventricle by the whole of their length. 2^d Some are attached to the wall of the ventricle only by their two ends being free in the centre. 3^d Some are attached to the wall of the ventricle only by one end, the other ends termi-



mate in small tendons which themselves are attached to the ventricular aspect of the valvular segments and being only long enough to allow the segments to close they prevent them floating into the auricle; the valve thus constituted is known as the tricuspid, the little tendons attached to its segments are called chordae tendinae and the muscular columns which produce them the columnae carnae.

The blood driven by the contraction of the right ventricle being prevented from flowing into the auricle by the arrangement above described is forced into the pulmonary artery and when the ventricle ceased its contraction would again rush back into it were it not for a valvular arrangement found here called the semi-lunar valves which guard the orifice of the pulmonary artery.

The semi-lunar valves are three segments arranged around the interior of the pulmonary artery just at its commencement; each segment is semi-lunar in shape, its convex border being attached and its straight border being superior and free; they consist of folds of living membrane strengthened by fibrous tissue, which is aggregated into a projection just in the centre of the free edge of each valve, called corpus Arantii there is a hollowed space where the valve lacks fibrous tissue except that just along the free edge of the valve are a few fibres of fibrous tissue. Now when the blood is being forced into the artery, there are forced back towards the wall of the artery, but behind each valve is a depression caused by dilation of the coats of the artery and these are called the sinuses of Valsalva and when the ventricle

Right ventricle

- 1/ Columnae 7/ Chordae tendinae
- 3/ Annulus Ventricular⁴/ Pul. art.
- 5/ Tricuspid valve 6/ Semilunar
- 7/- foramen Thebesii

Left Auricle

- 1/ 4 openings for the Pul. veins
- 2/ left aortic - Vent. opening -
- 3/ Musculi pectinati

ceases to contract the blood seeking to reenter the ventricle enters the sinuses of Valvula forces the valves inward, until they meet along their free edges when the corpora Arantii dropping together in the centre completely close the orifice these and the attachment of the valves preventing them from being driven too far down -

To sum up then the objects found in the right ventricle we have 1st Columnae Carinae - 2^d Chordae tendinae - 3^d Auriculo-ventricular opening - 4th The Opening into the pulmonary artery - 5th Tricuspid valve - 6th Semilunar valve - 7th There being of course foramen Thebesii -

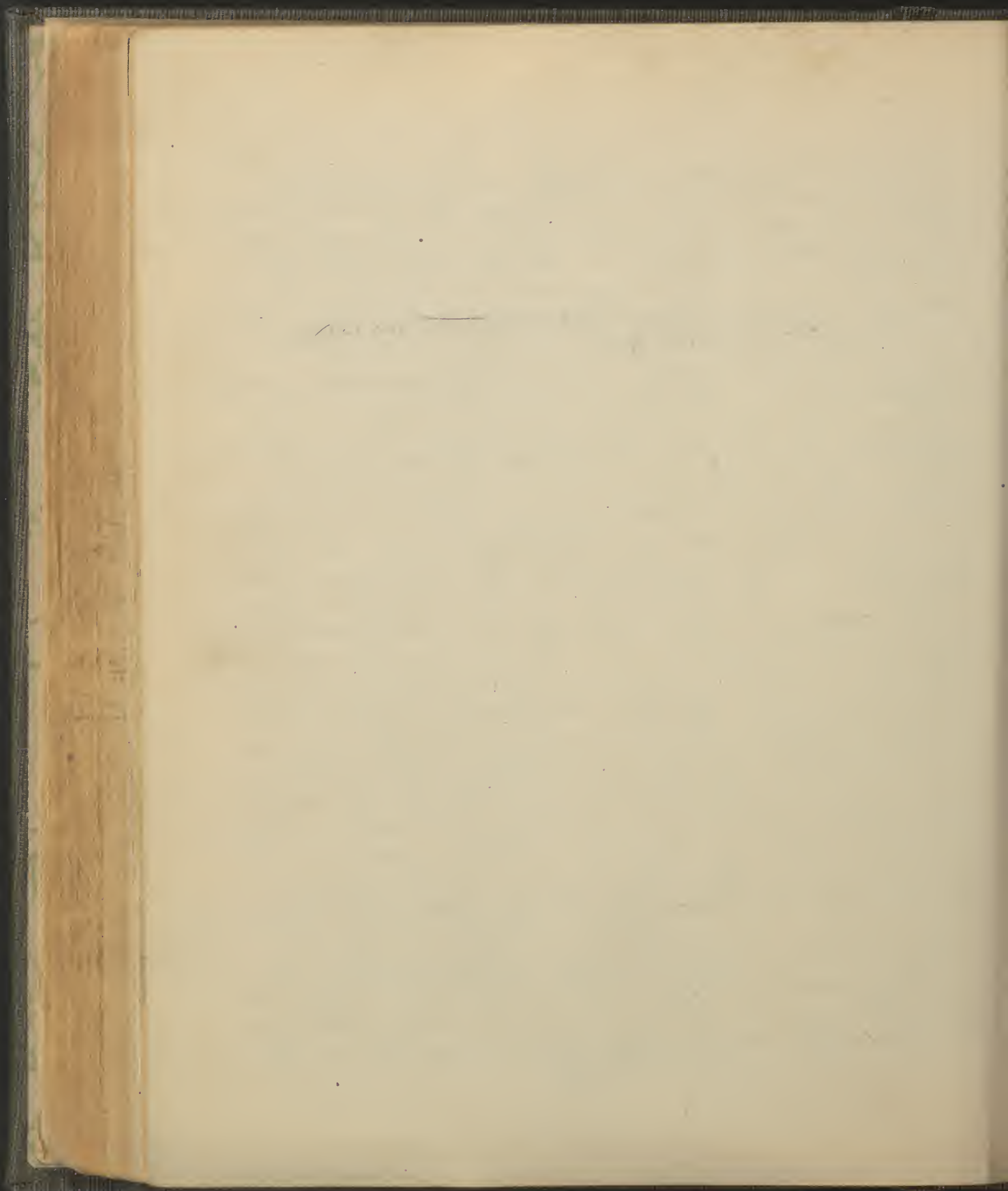
We come now to the left side of the heart and take first the Left Auricle, its wall is thicker than that of the right, being about $\frac{1}{8}$ of an inch while that of the right is about $\frac{1}{2}$ of an inch - It presents muscoli pectinati but fewer than in the right ("confined to appendix auriculari"), the opening into the left ventricle, left auriculo-ventricular and the openings of the four pulmonary veins which return the blood carried by the pulmonary artery to the lungs; two coming from each lung, the two from the left lung sometimes uniting before opening into the auricle -

To sum up we have in the Left Auricle - 1st four openings of the pulmonary veins - 2^d Left Auriculo-ventricular opening - 3^d Muscoli pectinati -

Passing to the Left Ventricle we find its wall three times as thick as that of the right ventricle (being $\frac{1}{2}$ of an inch thick, those of the right $2\frac{1}{2}$ twelfths of an inch"); it is thus seen that the left side of the heart is much more powerful than the right and this

Species of *Corpora Arantia*
D. (lunated Spaces)

is due to the fact that while the right ventricle has only to propel the blood to the lungs the left has to distribute throughout the system (its work being estimated at 13 lbs to the pulsation (?)). On the walls of the left ventricle are seen columnae carnae much more prominent and more intimately intersecting than in the right ventricle, their arrangement into three sets is however the same. 1st some attached their whole length. 2^d some attached at one extremity and terminating by the other in chordae tendinae. 3^d and others attached by both ends. The blood is forced from the left auricle into the left ventricle and when this contracts it drives it into the aorta, now there are valvular arrangements guarding both these openings, the left auriculo-ventricular and aortic. The arrangement at the left auriculo-ventricular is known as the Mitral or Bicuspid valve and is formed upon the same principle as the Tricuspid valve. It consists of two segments attached to a fibrous ring surrounding the opening by their larger extremity, their smaller being free in the cavity of the ventricle; it consists of folds of endocardium strengthened by fibrous and by muscular fibres and it receives the attachment of the chordae tendinae; so that it differs from the Tricuspid valve in being stronger containing more fibrous tissue and in consisting of two segments. The opening into the aorta is guarded by the Aortic Semilunar valves which in every way are the counterpart of the valvular arrangement in the pulmonary artery, except in being larger and stronger; they consist of three segments folds of living membrane with fibrous tissue; having the corpora Arantii lunated spaces and sinuses of



Valves just as in the pulmonary semilunar and the mechanism of their action is the same.

Thus in the Left ventricle there are 1st Columnae Carinae - 2^d Chordae Tendinae - 3^d Left Auriculo-ventricular opening - 4th Aortic opening - 5th Bicuspid Valve - 6th Aortic Semilunar Valves.

- Fœtal Circulation -

The variation in the course of the circulation before birth from that after birth is due to these facts, 1st that the blood of the fœtus has to pass through the placenta to become arterialized after being returned from the tissue: - 2^d that the lungs of the fœtus playing no part in oxygenating the blood only solicit enough to nourish them, and 3^d for the development of the important organs situated in the skull it is demanded that they receive the placental blood as pure as possible.

The fœtal heart is vertical in position. Examining the Right Auricle of the fœtus it is seen to present the following apertures, the opening of the superior vena cava which returns venous blood as in the adult; the opening of the inferior vena cava which returns blood of a peculiar hue one between that of arterial and venous blood the reason for this will be evident on further examination; the opening into the right ventricle and the coronary sinus; now extending from the entrance of the inferior vena cava along the wall of the auricle is seen a fold of its lining membrane producing a trough-like or valvular arrangement called the Eustachian valve which can be followed to the inter-auricular septum where it is to stop at an opening called the foramen ovale which occupies the place of the foramen

Location of heart.

lies between 2 pleura.

on cent line of diph.

$1\frac{1}{2}$ in. side of throat

$3\frac{1}{2}$ in. " "

corp. from 5 to 8" dorsal vertebra. sep. by the
sternum in the post. mediastinum.

apex heart abt opp the junct of Sternum and
uniform cart. (at 7th rib and " "

$3-3\frac{1}{2}$ in to left of this point

The free border of the st. ventricle is the
lower one and is nearly horiz. and

corresponds 7th rib (is the lower border of heart)

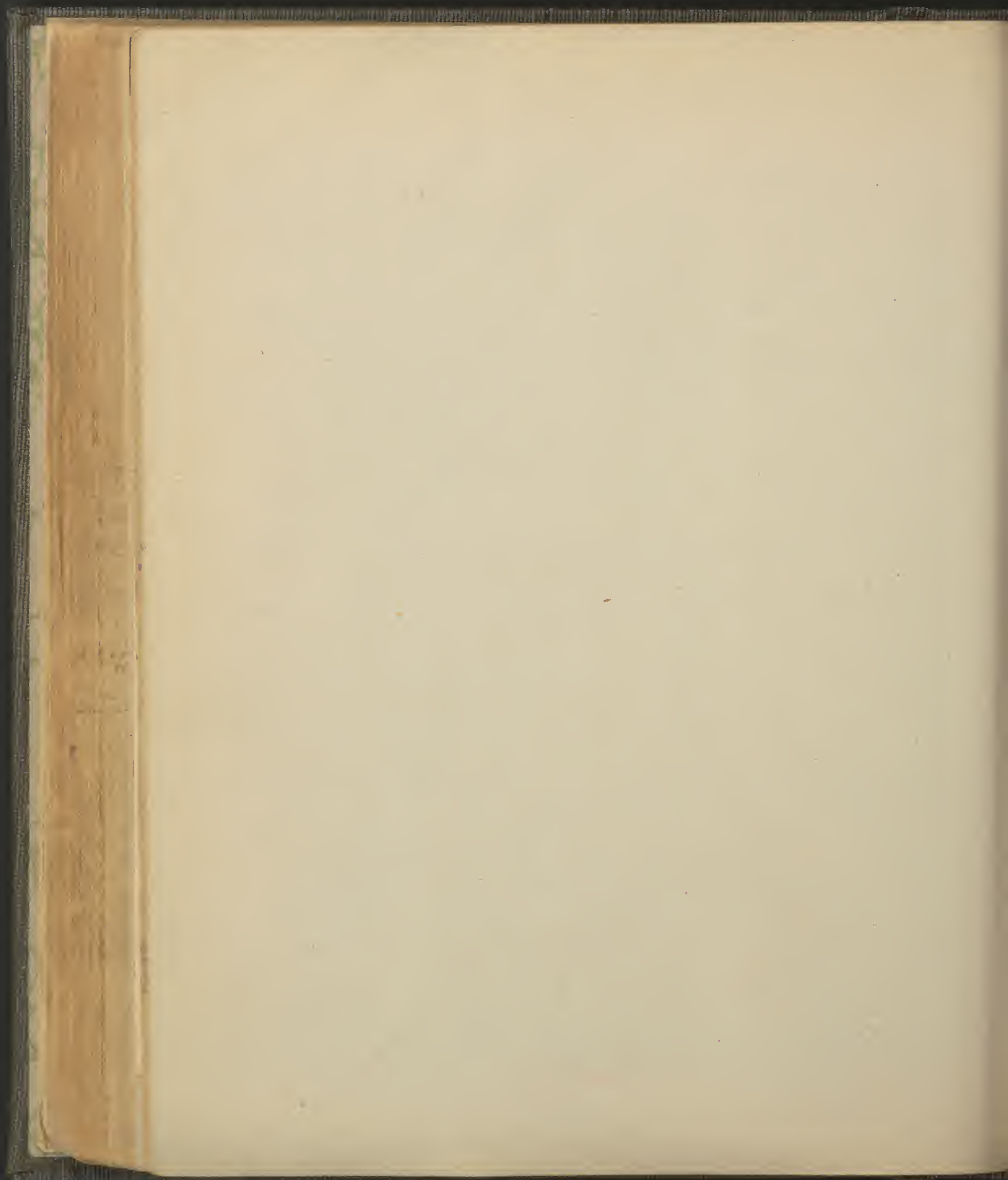
The upper border

Base is up. to st & back corresp to
a line corresp. to center of Sternum
or a horiz. line between the cart of
the 2nd ribs but is the highest
point of base (the upper border of the ribs)

Area: precordial dullness.

Cause by the connective tissue
intervening between the heart & the
chest wall and is located by.

oralis of the adult, and establishes a communication between the two auricles, the function of this Eustachian valve and foramen orale is to conduct the comparatively pure blood brought by the inferior vena cava through the right auricle without its being mingled with the vicious blood of the superior vena cava, and to transmit it to the left auricle, from thence it is driven into the left ventricle which in turn forces it into the aorta and it is nearly all distributed to the head and upper extremities through the branches which spring from the arch of the aorta. Following now the course of the blood poured into the right auricle by the superior vena cava, it is seen that it cannot mix with the oxygenated blood of the inferior vena cava owing to the Eustachian valve and foramen orale but must be driven by contraction of the right auricle into the right ventricle, from the right ventricle it is forced into the pulmonary artery and, now as the lungs require only enough blood for nutrition the pulmonary artery sends only a small branch to each lung, the bulk of its contents it transmits through a vessel called the ductus arteriosus to the aorta just below the transverse portion of its arch, where its blood mingles with that which is left from supplying the head and upper extremities. The ductus arteriosus is about the size of a goose-quill and $\frac{1}{2}$ inch long. The Aorta continues its downward course to divide into the two iliac arteries from the internal iliac subdivisions of these arise two vessels one from each called the umbilical arteries which ascend along the inner surface of the abdominal wall to the navel where they escape and forming part of the umbilical cord



they reach the placenta to distribute to it the impure blood which they convey and have it oxygenated; the blood after this process is brought back from the placenta through a single vessel the umbilical vein which enters the foetus at the navel and makes for the transverse fissure of the liver, the round ligament of the liver being the shrivelled remains of a part of this vessel, at the transverse fissure the umbilical vein splits into three vessels and on to the left lobe of the liver through which it circulates through the portal system one to the right lobe of the liver and the third vessel known as the ductus venosus passes backward to open into the inferior vena cava thus accounting for the character of the blood it transmits to the right auricle.

Returning to the aorta, after it has produced the umbilical arteries it distributes the blood left it to the lower extremities; this blood is returned through veins which continually uniting finally produce the inferior vena cava, the venous blood which it conveys being mingled with the impure blood brought by the ductus venosus it pours its contents into the right auricle.

(The essential peculiarities of the foetal circulation then are 1st The Ductus Venosus - 2^d The Foramen Ovale - 3^d The Foramen Ovale - 4th The Umbilical arteries - 5th The Ductus Arteriosus -)

About 10 days after birth all the peculiarities above described have disappeared and the circulation becomes such as we have seen in the adult.

- The Brain -

Sumas of Deca onate
how formed?

The chain of nervous centres known as the cerebro-spinal axis is divided into two portions, the one contained in the vertebral column, is called the spinal cord or marrow or medulla spinalis; the other contained in the cranium is called the brain or encephaloid (the latter includes the membranes.)

Enveloping each of these portions and lining its containing cavity are three membranes lying one within the other and called its investing membrane (meninges)

The Membranes of the Brain.

The three investing membranes of the Brain are 1st next the cranial wall the Dura Mater - 2^d next the Brain the Pia Mater and 3^d between these two the Arachnoid.

1. The Dura Mater is a grayish white strong fibrous membrane which lines the inner surface of the cranial walls adhering pretty closely by its external surface to the bone particularly at the base of the cranium and is the source of the sutures. Its inner surface is smooth and glistening because lined by the arachnoid.

Besides lining the inner surface of the cranium, the Dura Mater gives off processes which innervate themselves between the two portions of the Brain.

These processes or partitions are three in number and as follows - 1st Falx Major (cerebri) is a sickle-shaped fold of the Dura Mater which lies in the longitudinal fissure, attached in front to the crista Galli it extends along the middle line to the anterior occipital protuberance behind, being continuous with the Dura Mater along the vault of the

In front presents a deep notch.

Altho' also to Folx major behind.

Not so the Archwood has only
one leaf - See recent investigation
" Gray,

P. M. is much - Numban
of Numban

cristum between these points and separating the two hemispheres of the cerebrum.

4. a certain distance forward from the anterior occipital protuberance corresponding in extent to the cerebellum, its lower edge is adherent to the upper surface of the Tentorium.

2^d The Tentorium (cerebelli) is stretched horizontally across the inferior occipital fossae, attached behind to horizontal limbs of the occipital cross and in front to the upper border of the petrous portion of the temporal bone on each side and the clinoid processes.

3^d Falx Minor (cerebelli) is a narrow process formed separating the hemispheres of the cerebellum; it is attached along the lower vertical limb of the occipital cross and forking as it approaches the foramen Magnum where it ceases.

is a layer of cells resembling a serous

II. The Arachnoid is a serous membrane and ~~consists~~ ~~essentially~~ ~~a closed sac~~ one of its layers lining the inner surface of the Dura Mater and called the parietal layer, the other investing the Brain from which it is separated however by the Pia Mater; this layer is called visceral; Though enveloping the Brain it does not dip into the sulci but leaps from convolution to convolution.

III. The Pia Mater is an extremely thin membrane, very vascular consisting in fact of interlacing small blood-vessels and lying on the surface of the Brain: it not only covers the convolutions but passes down to the bottom of the sulci, and the space thus left between the Pia Mater is an extremely thin membrane, very vascular consisting in fact of interlacing small

Opposite Sella Turcia
(cont. unachord space)

blood-vessels and lying on the surface of the Brain: it not only covers the convolutions but passes down to the bottom of the sulci - and the space thus left between the Free Water as it dips to the bottom of the sulci and the arachnoid which passes over the sulci from convolution to convolution is called the sub-arachnoid space.

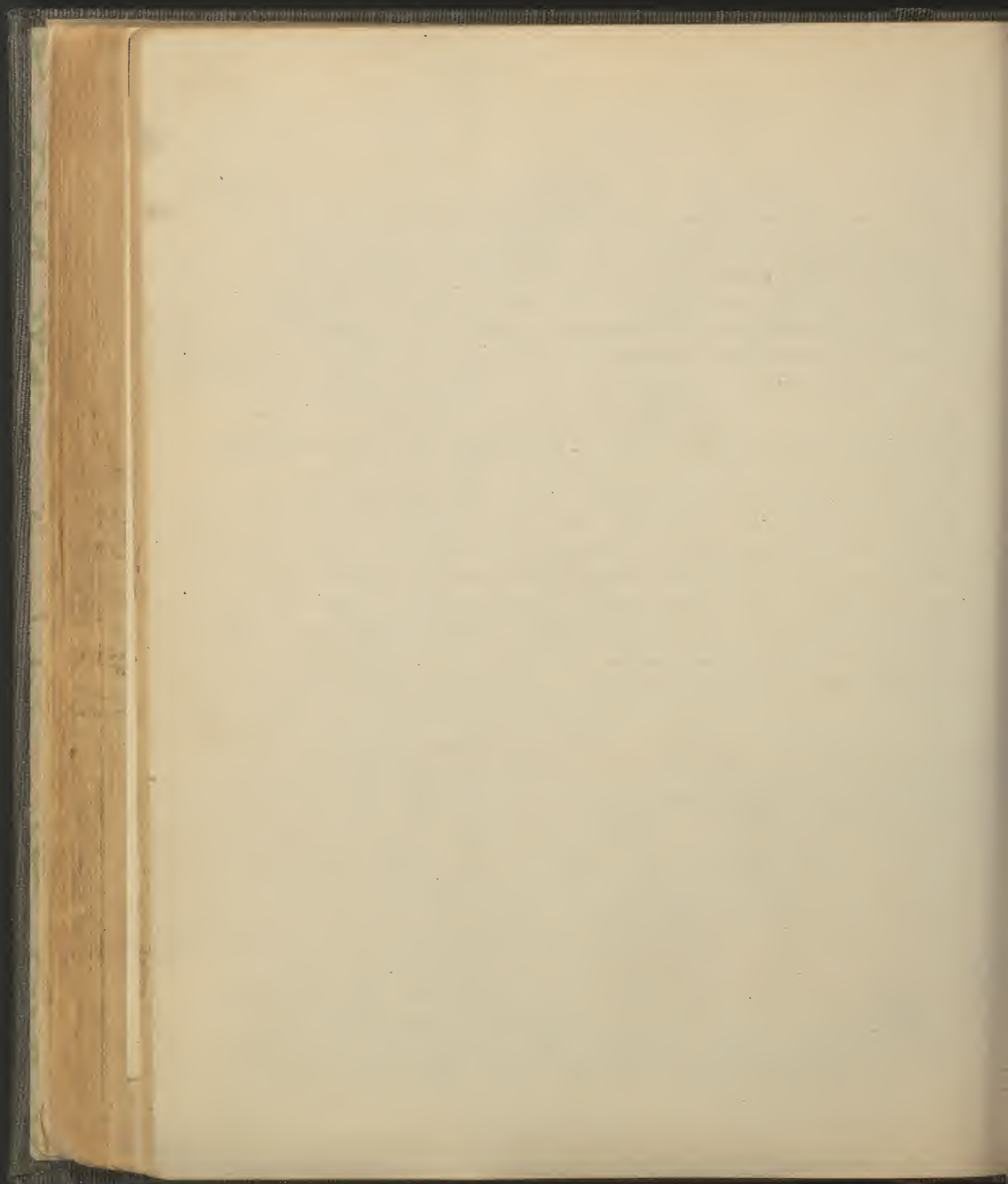
wh. contains a fluid
very important -

- The Brain -

The Brain is subdivided into four parts, viz. cerebrum, cerebellum, Fora Carolii and Medulla Oblongata.

The Cerebrum, seven or eight times the size of the rest of the Brain, presents that uneven surface called convolutions consisting of meandering elevations called convolutions with corresponding depressions, as much or so deep, called sulci and when examined closely these convolutions are seen not to be exactly similar on the two sides of the brain - The Cerebrum is subdivided into parts as follows - Looking upon its upper surface there is seen a fissure called the longitudinal extending along its centre from before backwards, this fissure, as may be seen by looking at the base of the Brain, extends entirely through both in front and behind, but for the middle 3^d of the cerebrum it extends downwards only about an inch from the upper surface; the sides of the Cerebrum thus separated are called its Hemispheres (right and left.)

Now when the cerebrum is invested and its under surface is viewed, each of its Hemispheres is seen to be divided into 3 portions one behind the other and called Lobes, anterior, middle and posterior - 1st - The Anterior Lobe rests in the anterior fossa of the base of the cranium and is separated from the



middle lobe by an oblique fissure called the fissure of Sylvius in which lies the lesser wing of the Sphenoid bone (it is separated from its fellow by the longitudinal fissure.)

2^d. The Middle Lobe rests in the middle fossa of the base of the cranium, it is separated from the anterior lobe in front by the fissure of Sylvius, behind it is separated from the posterior lobe by no fissure but the line of separation corresponds to the anterior border of the cerebellum and also to the upper border of the petrous bone which leaves a slight groove by its contact. (it is separated from its fellow above by the longitudinal fissure but since this does not extend through the cerebrum between its middle lobes their separation below is arbitrary being the middle line.) The Posterior Lobe begins in front where the middle terminates and lies upon the Tentorium in the superior occipital fossa the cerebellum being beneath and coextensive with it anteriorly. (it is separated from its fellow by the longitudinal fissure.)

- The Base of the Brain -

The Base of the Brain, that portion which presents to the floor furnished it by the base of the cranium, is composed of portions furnished by the four primary subdivisions and presents many points to be investigated.

Beginning in front we here see in the middle line the longitudinal fissure. on either side of this is the 1st cranial nerve or olfactory nerve which emerging from the substance of the Brain just at the front of the middle lobe extends forward beside the longitu-

Sub-upt Sylvarum fissum

Sub-upt { Laminia cinerorum
peduncles of Coprus Callosum
Pons Vanlii

longitudinal fissure, flattened or somewhat triangular in shape, lying in a groove and terminates near the front of the Brain in a dilated extremity (olfactory bulb). Just behind the longitudinal fissure, as seen on the front of the Base, are two nerves, the 2^d pair of cranial nerves or optic, these diverge from each other forward, from a point where they are united; this union of the two nerves situated between the origins of the olfactory nerves and just behind the longitudinal fissure is called the optic commissure or chiasm and diverging from this chiasm backward are seen two flattened cords called the optic tracts which after a short divergent course disappear in the substance of the brain - In the angular interval left on each side of the optic chiasm, between the optic nerve in front and the optic tract behind is seen a number of small apertures in the substance of the Brain left by tearing out small arteries, which here enter, this appearance on each side is known as the substantia perforata - Just behind the optic chiasm and between the optic tracts is seen a grayish prominence called the tuber cinereum and projecting from the centre of this for about $\frac{1}{6}$ of an inch is a small tube-like prolongation called the infundibulum which is tipped by a small reddish body called the pituitary gland which (weighing 5-10 grs) consists of an anterior and posterior lobe and lies in the sella turcica.

Hollow in early life

Just behind the tuber cinereum are two round small white pea-like bodies, one on each side the middle line, lying beside each other and called corpora albicantia, behind these is seen a collection of

Medula.

The framen coccum a cul de sac of pia mater at
junct of pons & ant. med. fusum.

Circa cerebri

apertures, just like those forming the two substantias herforatre, this is called the locus perforatus or perforated spot there being but one collection here in the centre, just behind this is seen the broad band of transverse fibres called the Pons Varolii and passing forward from this are two flattened large cords diverging from each other and intersecting the optic tract of each side before being lost in the substance of the Brain; these are known as the crura cerebri - Between the diverging crura cerebri postero-laterally and the optic tracts antero-laterally, the optic chiasm in front and the anterior edge of the Pons Varolii behind is a circumscribed portion of the Base of the Brain known as the six sided or interpeduncular space; its boundaries are as above stated, its contents are 1st Tuber Cinereum - 2^d Infundibulum - 3^d Corpora Albicantia - 4th Locus Perforatus.

- The Medulla Oblongata -

Extending from the foramen magnum (upper border of the atlas) to the posterior lower border of the Pons Varolii the medulla oblongata is formed thus establishing connection between the spinal marrow and the Brain, conical in shape, the large end above and forward, it is about $1\frac{1}{4}$ inches in length. Passing down its centre in front is the anterior median fissure and similarly marking its centre posteriorly is the posterior median these though not entirely bisecting it serve to indicate its division into lateral symmetrical halves, each half is subdivided into four portions by 3 longitudinal grooves; lying beside the anterior median fissure and separated by it from its fellow is the portion called the

Note a cursation of ant. Col. apparently but really of total ^{crossed pyramids} Col. if the ant. Col. are drawn apart slightly.

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corpus. Pyramidale, just behind this, slightly more bulging and separated from it by a fissure is the second portion, the corpus olivare, being visible for about $\frac{1}{2}$ inch only. Behind this last is the third portion called the corpus Rectiforme separated by a groove from the corpus olivare in front and by another slight groove from the fourth portion of the posterior pyramid, which lies behind the corpus rectiforme and beside the posterior median fissure by which it is separated from its fellow; the two posterior pyramids are small but as they are followed up they suddenly dilate into a bulbous enlargement and again as suddenly decreasing they separate as they ascend the one from the other and leave an angular interval called the calamus scriptorius (writer's pen) - When the Medulla Oblongata reaches the Pons Varolii it seems on superficial view to stop short, but if the surface fibres of the Pons which are transverse in direction be peeled off it is seen that the Pons consists in its centre of vertical or longitudinal fibres which are continuous with the fibres of the medulla oblongata below and being gathered into two bands emerge from the anterior border of the Pons as the two crura cerebri.

- Summary -

In summing up the appearances met with on the base of the Brain there are: from before backward:
1. Longitudinal fissure in the centre - 2. Olfactory nerve and its Bulbous Olfactories - 3. Optic Nerve - 4. optic chiasma - 5. optic tract - 6. Substantia perforata - 7. Tuberculum cinereum - 8. Infundibulum - 9. corpus Albicans - 10. Locus perforatus - 11. Crus Cerebri -

100
7/12/48
1/1
2554

140

2 *Fons Varolii* - 13 *Medulla Oblongata*. Of these thirteen objects the 2^d 3^d 5th 6th 9th & 11th are double i.e. there is one on each side of the middle line, the others are each single, i.e. they lie on the middle line extending on either side of it more or less -

- Structure of the Cerebrum -

When a horizontal slice an inch or so thick is removed from the upper surface of one hemisphere of the cerebrum the cut surface shows a central oval shaped white portion, while around this on the exterior of the hemisphere is a serrated grayish border, this is known as the centrum ovale minus. When both hemispheres have been cut to the same level and this level corresponding to the depth of the central portion of the longitudinal fissure two central ovalia minora are produced connected in the centre by transverse fibres forming a connecting band called the corpus callosum: this whole appearance formed by the two central ovalia minora and the corpus callosum is known as the centrum ovale majus.

- Corpus Callosum -

The corpus callosum consists almost entirely of transverse fibres passing from one hemisphere to the other; upon its upper surface is seen a shallow groove extending along the middle line from before backward and called the raphe; bordering the sides of the raphe is a slight ridge produced by a bundle of longitudinal fibres, the two ridges being called the nerves of Lancisi; external to these are seen a few other longitudinal fibres pro-

occupying the middle $\frac{1}{3}$ of Kain -

dividing slight ridges and called the lateral longitudinal striae. When the corpus callosum is bisected longitudinally it is seen to be about four inches long and to bend vertically downward both in front and behind the bent rounded posterior extremity is called its Ball or Splenium; the central portion the body, the anterior bent portion the Genu, which turns backward beneath the body for a short distance under the name of Rostrum. The Rostrum divides into two cords called peduncles which pass downward and backward to the base of the Brain. Contained in the substance of the Brain between the corpus callosum and the base is an irregular cavity divided into several parts, two of these are known as the lateral Ventricle.

- Lateral Ventricle -

The corpus callosum forms the roof of an irregular shaped cavity which is divided into two similar parts by a septum along the middle line, each part being called a lateral ventricle right or left. (The right is also called the 1st Ventricle and the left the second). When the corpus callosum has been removed the floor of the lateral ventricle is brought into view which is formed by various objects, in front and external is the corpus striatum an oblong grayish mass with its large end in front: internal to this and lying against its inner aspect is a narrow white band the Tænia Semicircularis, just within this is seen a small portion of an olive shaped white body the Thalamus opticus which is seen, is a small bundle of blood vessels running from behind forward and gathered into a round cord called the



Choroid Plexus runs along the edge of the inner object seen in the ventricle called the Fornix. The Fornix forms the inner portion of the floor of each ventricle and rises to a ridge in the centre which ridge touches the under surface of the corina callosa and thus forms the septum between the two ventricles. The Fornix is triangular in shape its small end being in front and terminating in two cords called crura which pass downward to the corpora Albicantia and touching their inner aspect to ascend to the stria thalami. Behind the edges of the fornix are continued towards the base of the Brain in a tortuous course under the name of corpora fimbriata.

The cavity of the lateral ventricle is prolonged forward by a small triangular cavity called the anterior corn, posteriorly it presents a longer larger prolongation called the posterior corn, besides these two cornua there is a third called the middle corn into which the corpus fimbriatum disappears. Now the middle or descending corn begins just where the posterior corn joins the body of the ventricle and its direction is tortuously downward, it first runs outward and backward then downward and forward and inward: on it are several objects as follows. Running up through it is the bundle of blood vessels called the choroid plexus these vessels having pierced the thin layer of brain substance which separates the bottom of the corn from the base of the Brain into the descending corn the corpus fimbriatum, the continuation of the posterior angle of the Fornix, is seen to disappear as a white band which

Convolution of the brain
See Gray -
Tissue of brain
See Gray -

descends following the course of the cornu to the base of the Brain;— in the descending cornu is also seen a ridge called the Hippocampus major which following the course of the cornu terminates at its bottom in an enlargement called the Pes Hippocampi— Just where the descending and posterior cornua communicate with the body of the ventricle is found a projection between the two cornua called the Pes Accessorius to which the Hippocampus Major leads from the descending cornu and to which a similar but smaller ridge seen on the bottom of the posterior cornu also leads, this ridge being called the Hippocampus Minor—

The septum between the two lateral ventricles as stated in the ridged centre of the fornix, but since the fornix is too short to reach to the anterior extremity of the ventricle, the separation of the ventricles is completed here in front for a short distance by a double layered septum called the septum lucidum and between the two layers of this septum is a minute interval which is called the 5th ventricle—

Now having examined the lateral ventricles cut away the fornix and choroid plexuses and just beneath them will be exposed another cavity called the 3^d ventricle— lying between the optic thalami, which forms its sides, its floor corresponds to the six sided space of the base of the Brain— its roof was the fornix² its anterior boundary is a white band passing between the two corpora striata and called the anterior commissure, its posterior boundary is another white band called the posterior commissure; passing across between the optic thalami; crossing the centre of the ventricle, also between the optic thalami is a third band called

grey-middle

Ref to 3rd Vent. Pa 445-

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the soft commissure - (the space in front of the soft commissure is sometimes called the foramen commune anterior and that behind it the foramen commune posterior.)

In this ventricle may be seen four openings -
1st on the front of the floor opens a canal which leads into the infundibulum and called the road to the infundibulum (iter ad infundibulum). On the front part of the roof are seen two small apertures one on each side of the middle line: these are the foramen of Monro and exist for the purpose of allowing the choroid plexuses of the lateral ventricles to pass into the 3^d ventricle.

The choroid plexus of each lateral ventricle as has been seen consists of a rounded mass of small arteries, these perforate the bottom of the middle cornu of the lateral ventricle collect into a rounded cord which mounts up through the descending cornu passes forward along the side of the fornix and when it reaches the anterior extremity of the fornix it disappears by notching the edge of the fornix and enters the 3^d ventricle where it meets its fellow on the under surface of the fornix and the two immediately spread out so as to form a membrane-like layer of blood vessels which covers the under surface of the fornix and forms in fact the true roof of the 3^d ventricle; this layer is known as the velum interpositum. - The 4th opening into the 3^d ventricle is seen behind just beneath the posterior commissure and leads backward and downward to another cavity called the 4th ventricle which is formed between the cerebellum and medulla oblongata; the communication between the 3^d & 4th ventricles is

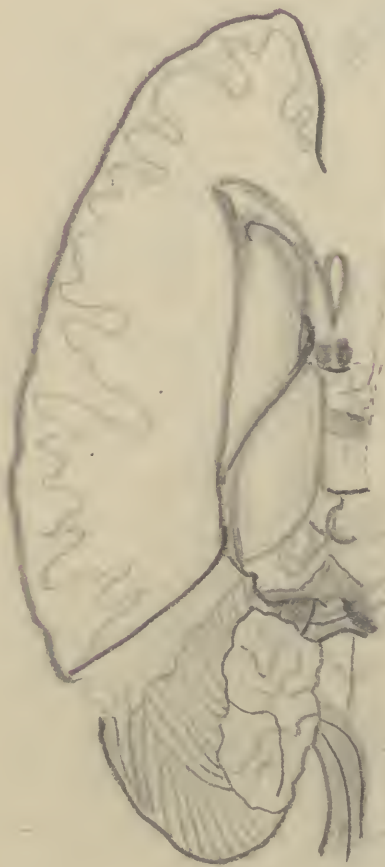


fructulum

called the aqueduct of Sylvius (iter a testis ad quantum ventriculum). Dissecting up either optic thalamus, there is seen on its under surface posteriorly two small oblong elevations, one lying internal to the other and separated by the optic tract which passes between them, the outer of these bodies is called the corpus geniculatum externum, the inner the corpus geniculatum internum. Immediately behind the 3^d ventricle and over the aqueduct of Sylvius (and beneath the Bulb of the corpus collosum) are seen two pairs of elevations collectively called the corpora quadrigemina, the elevations are placed two anterior, one on each side of the middle line, called the nates, and two posterior one on each side of the middle line, called the testes; passing outward and forward to the optic thalamus. From each side of the corpora quadrigemina are two bands or ridges, one from the nates and called brachium posterius. Lying between the nates is a reddish conical projecting small mass called the Pineal gland, having a cavity in its interior containing a little viscid liquid and a small quantity of gritty matter - It is held in place by four peduncles or cords, two passing downward from the base of the gland which rests between the nates ("to the optic thalami") two pass forward one on each side, skirting the inner aspect of the optic thalami along the lateral wall of the 3^d ventricle (to the crura of the fornix -)

- The Cerebellum -

The cerebellum is some 8 times smaller than the cerebrum and is found in the two inferior occipital fossae lying beneath the posterior lobes of the cerebrum from



3rd Vent

corpus Strualium

Ternia Semi

Thal - Obliquus.

Penial Gland

Testis Valve View -

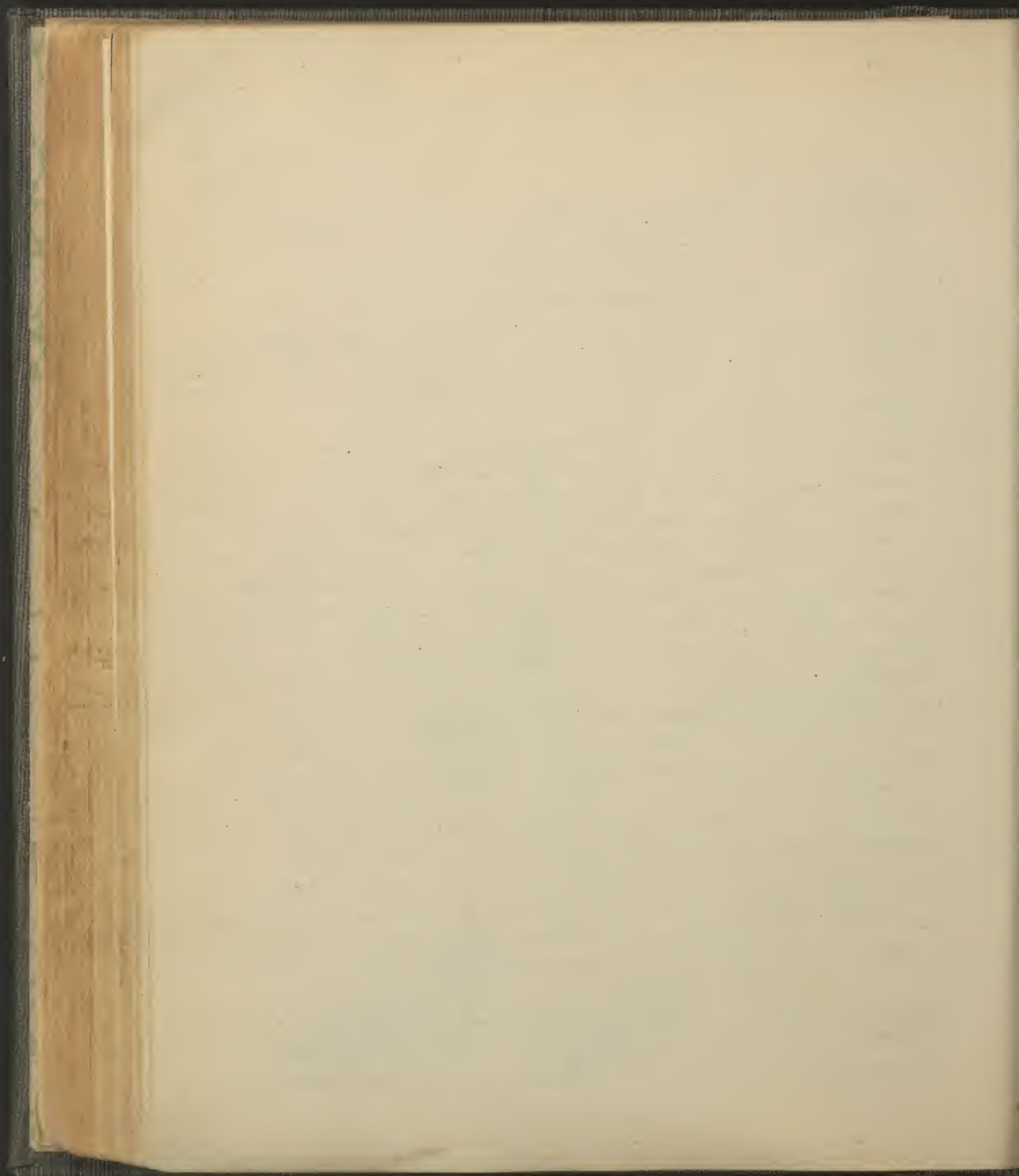
C. vella testis

Post Pyr.

Rectiform body -

which it is separated by the tentorium. The appearance of its surface differs from that of the cerebrum in not being convoluted but is marked by numerous furrows (sulci) more or less curved between which are seen plate-like parts of brain substance called laminae and hence the surface is said to be laminated. It is of oblong shape its greatest diameter being transverse (measuring about 4 inches) - It is divided into two hemispheres superiorly by a ridge called vermis superior which extends along the middle line from a notch in the centre of the front edge called the anterior notch (incisura anterior) to another notch on the centre of the posterior border called the posterior notch (incisura posterior); on the under aspect the two hemispheres are separated, or rather the separation is indicated by a groove, broad and shallow extending from the anterior to the posterior notch, and called the valley (vallcula); running along the bottom of which from before backward is another ridge called the vermis inferior. When a vertical antero-posterior section is made of either hemisphere an appearance is produced called arbor vitae which resembles the trunk of a tree with some 10-12 branches - the trunk of the tree is white and placed anterior, the branches are also white and diverge from the horizontal trunk superiorly, inferiorly and posteriorly; the surrounding substance being gray - About the centre (little above and posterior) is an irregular mass of gray matter called the corpus dentatum.

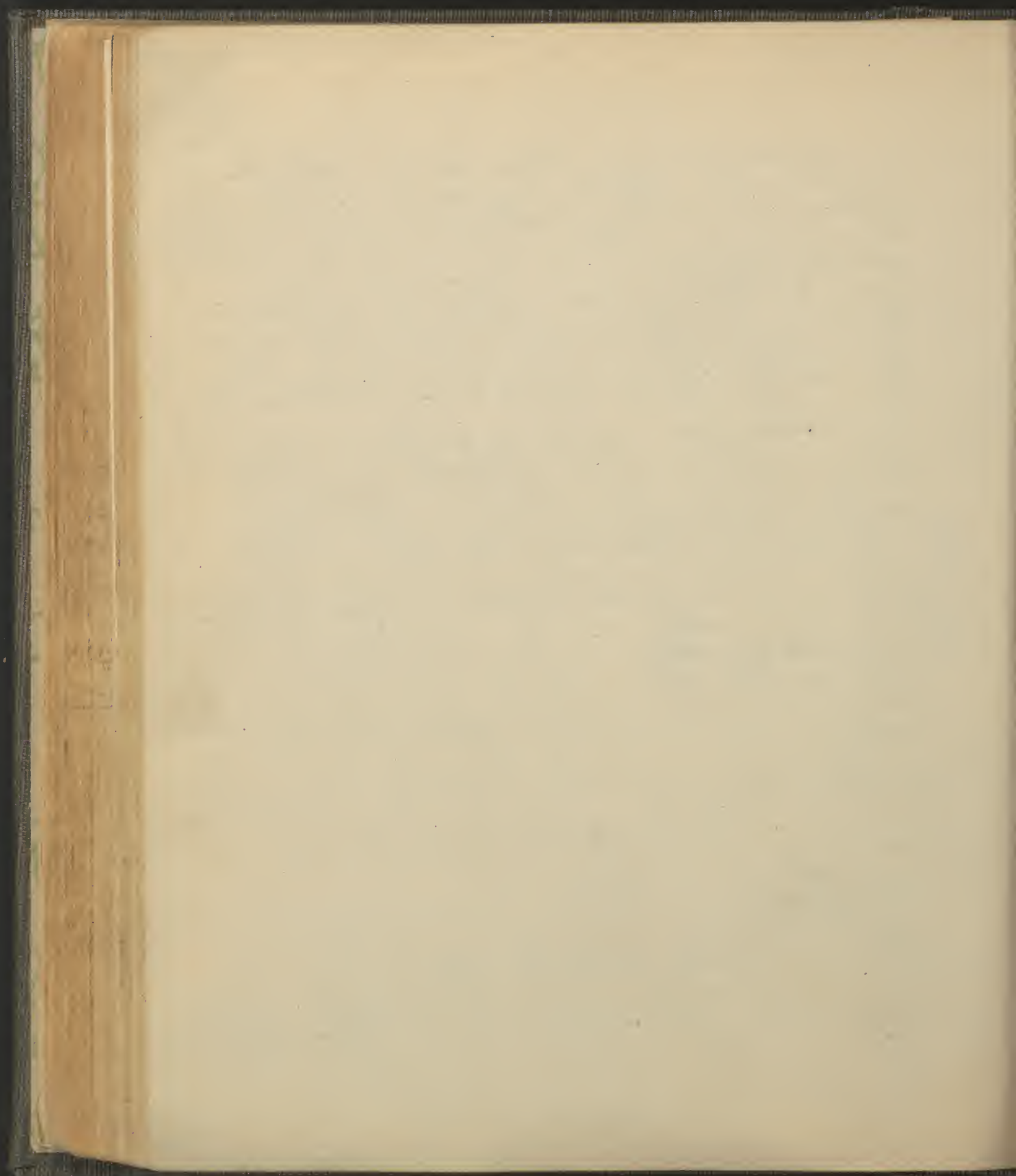
Beneath the cerebellum, between it and the posterior aspect of the medulla oblongata is the 4th Ventricle - it is of elongate shape (triangular in vertical section)



and its boundaries are as follows; its floor is the sulcus scriptorius of the medulla oblongata; its roof is formed by two elements, the lower posterior part is the cerebellum. The front part is a thin membrane-like layer called the valve of the Brain, *valve Cerebrum*; each side is formed by a thick cord passing from the cerebellum to the testis and called *processus and cerebelli ad testes*. The ventricle is closed behind and below by a fold of Pia Mater as it passes from the medulla to the cerebellum.

(On the floor of the ventricle are seen two rounded oblong ridges called *fasciculi testes*, crossing these as they are passing from the posterior median fissure outward are the fibres of origin of the 8th nerves (auditory); these fibres being white and running transversely are called *lineae transversae* - on that portion of the roof formed by the cerebellum are four projections one in front on the middle line, called the *modulus*, one just behind this, called the *uvula*, and one on each side of the *uvula* called *tonsil* (*Amygdala*) - communicating with the front upper extremity of the ventricle is the aqueduct of Sylvius, which passes upward and forward beneath the *corpora quadrigemina* to the back part of the 3^d Ventricle. The 4th Ventricle was called by the older anatomists the 1st since it is more easily reached and more constant in its existence in the different natural orders.

The different parts of the Brain are connected (generally by white fibres) in order to harmonize the actions of the various parts. The two hemispheres of the cerebrum and their subdivisions are connected across the middle line by 1st the *corpus callosum*, 2^d the anterior com.



3^d the middle commissure - 4th the posterior commissure - The different parts of the same hemisphere are connected by white fibres which pass from before backward, as the crura of the fornix, the tectio semicircularis trachium anterior and posterior &c - The two hemispheres of the cerebellum are connected by the crura superior and inferior by the transverse fibres of the Pons (Varolii, which leaving the anterior part of one hemisphere under the name of crura cerebelli as a white cord, pass across forming the transverse fibres of the Pons and enter the other hemisphere as the other crura cerebelli -

The two sides of the Medulla Oblongata are connected by a central commissure like the spinal cord) and by a decussation of the anterior pyramids across the anterior median fissure -

The cerebellum is connected to the cerebrum by the two processes cerebelli ad testes, which pass to the testes - The Medulla Oblongata is connected to the cerebellum by the corpora semiformia which pass into it under the name of processes ad Medullam oblongatam - It is connected to each hemisphere of the cerebrum by one of the two crura cerebri which as have been seen from the longitudinal fibres of the Pons and emerge from its anterior border to reach the cerebrum -

The Organ of Hearing -

The organ of hearing is connected with the temporal bone of each side and properly speaking consists of two organs one to each side - In the prepared bone a portion is still preserved for upon the base of the petrous bone is seen the external auditory meatus (its bony por-

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H. J. ...

tion), on the posterior surface of the petrous portion is the internal auditory meatus at the bottom of which as seen the internal wall of the inner chamber perforated by ~~many~~ ^{numerous} apertures, the external wall of the inner chamber is seen by looking into the external auditory meatus; on the anterior face of the petrous portion is also seen the ledge of the superior semicircular canal and just external to this a depression corresponding to the roof of the middle chamber or Tympanum, the floor of which is the jugular fossa of the petrous face of the petrous bone.

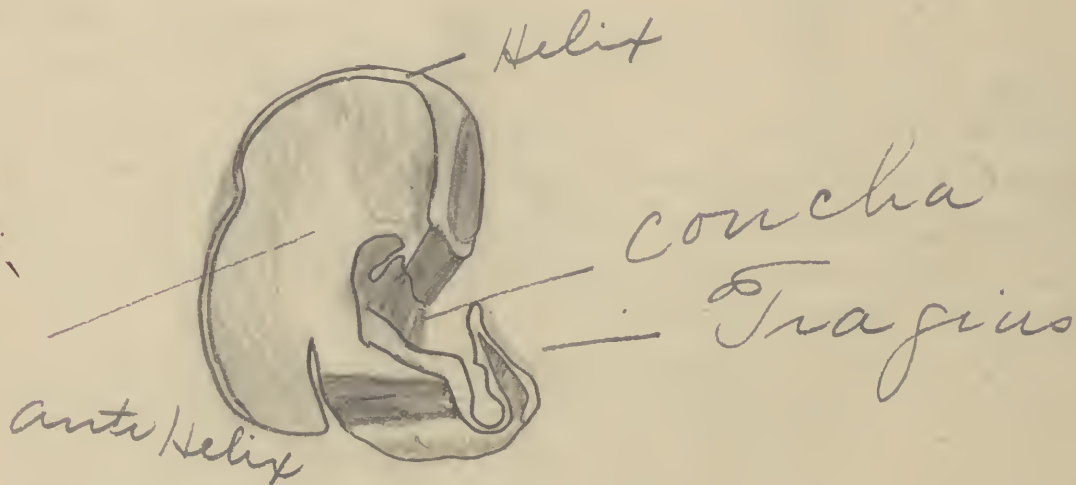
The organ of hearing is described as consisting of three portions, three chambers, lying the one internal to the other, upon the base and in the substance of the petrous bone. These three chambers are known as follows, from without inward, 1st the external ear consisting of three portions (a) pinna or auricle (B) meatus and (C) membrane Tympani - 2^d The Middle ear or Tympanum - 3^d The Internal Ear or Labyrinth -

The External Ear -

The external ear as stated consists of three portions, pinna, external auditory meatus and membrane of the Tympanum; the function of these is to collect the various vibrations and conduct them to the middle ear which in its turn transmits them to the internal ear where they encounter the sentient nerve of hearing. The Pinna or Auricle is the expanded outer extremity of the external chamber found on the base of the petrous portion of the temporal bone and contributing to its termination in the external auditory meatus. It faces into a very concave surface and the various

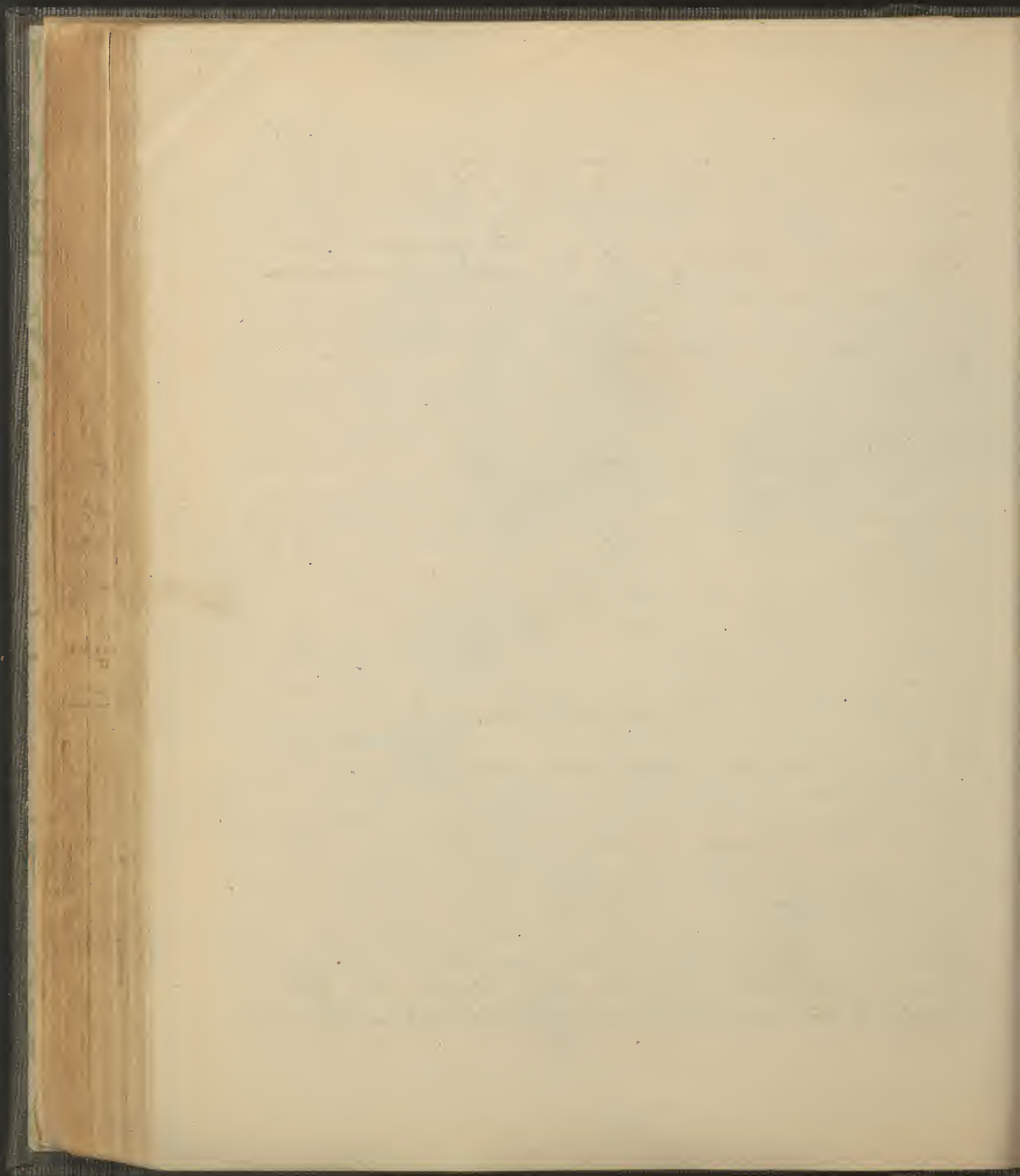
Cartilage of ear

G. J. Wilson
Dec. 10, 1889



elevations and depressions have received individual names - The central concavity leading to the external auditory meatus is called the "concha", the more or less folded "rimae" or rim the "Helix"; the pendant lower softer portion "Lobulus"; the triangular prominence jutting out in front of the concha the "Tragus"; behind and somewhat below this separated from it by a notch is another projection the "Antitragus". The curved elevation between the helix and ear, or rather behind the concha is the "Anti-helix" which divides superiorly enclosing a depression the "Fossa oralis (triangularis)"; the deeply sunken concavity between the helix and anti-helix is the "Fossa subhelical or innominata". The pinna varies greatly in appearance in different people, especially in this kind of lobule. In structure it consists of a plate of fibro-cartilage whose folding produce the afore-mentioned prominences and depressions this cartilage being covered by the integument and areolar tissue supporting various insignificant muscles (intrinsic) intended to vary its shape and giving attachment to other small muscles (extrinsic) intended to move the ~~portion~~ ^{position} of the pinna, though of these latter some few people have use, the former never act to produce visible effect.

The cartilage is not continuous through-out the auricle, for it is altogether wanting in the lobule and besides presents several fissures which have received names - The pinna is held to its position by the integument, by the extrinsic muscles mentioned above and by two ligaments: the anterior extends from the helix to the zygoma: the posterior from the concha to the mastoid process - Besides these there are

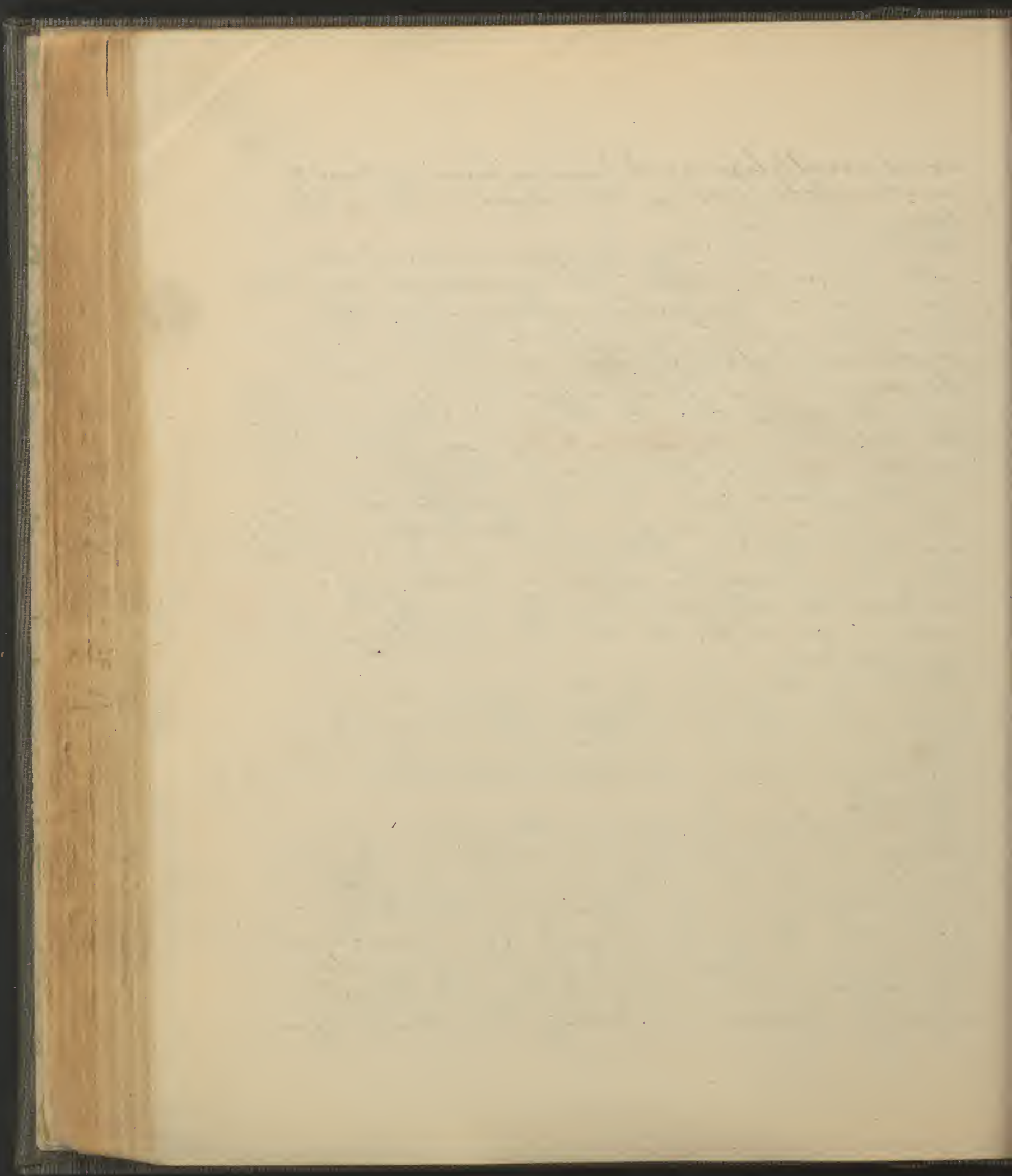


several small ligaments passing from one part to another of the cartilage the largest is the one the tragus and helix.

The External Auditory Meatus is the canal which extends from the concha to the Tympanum, separated from it by the tympanic membrane. It is rather more than an inch in length, its direction being inward and slightly forward, somewhat curved in its course having its convexity upward and smaller in the centre than at either end - It consists of two portions an external cartilaginous portion about one third of its length and an internal osseous portion the remaining $\frac{2}{3}$ which terminates internally at an oblique circular groove for the attachment of the membrana tympani. This portion can be seen in the dried bone though the septum at its bottom of course is absent, the external extremity is seen to be rough and prominent for the attachment of the cartilaginous portion.

It is lined throughout by the integument which towards the exterior is studded with hairs and contains glands for the secretion of the ear-wax these hairs and wax are intended to obstruct the entrance of insects.

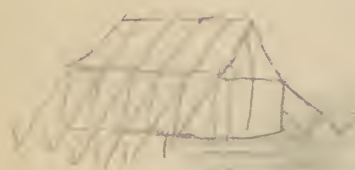
The Membrana Tympani is the septum of division between the external and middle chamber of the ear being situated at the inner extremity of the external auditory meatus attached in the oblique groove there found. It is fragile semi-transparent nearly round, oblique in its direction, from above downward and inward striking the floor at an angle of 45° and is seen to bulge towards the tym



panum leaving a corresponding concavity external. Its frame-work is fibro-elastic consisting of radiating and concentric fibres the latter especially seen near its circumference, this is covered externally by the integument lining the external auditory meatus which is exceedingly sensitive internally, it is coated by the mucous membrane of the tympanum.

The Middle Ear.

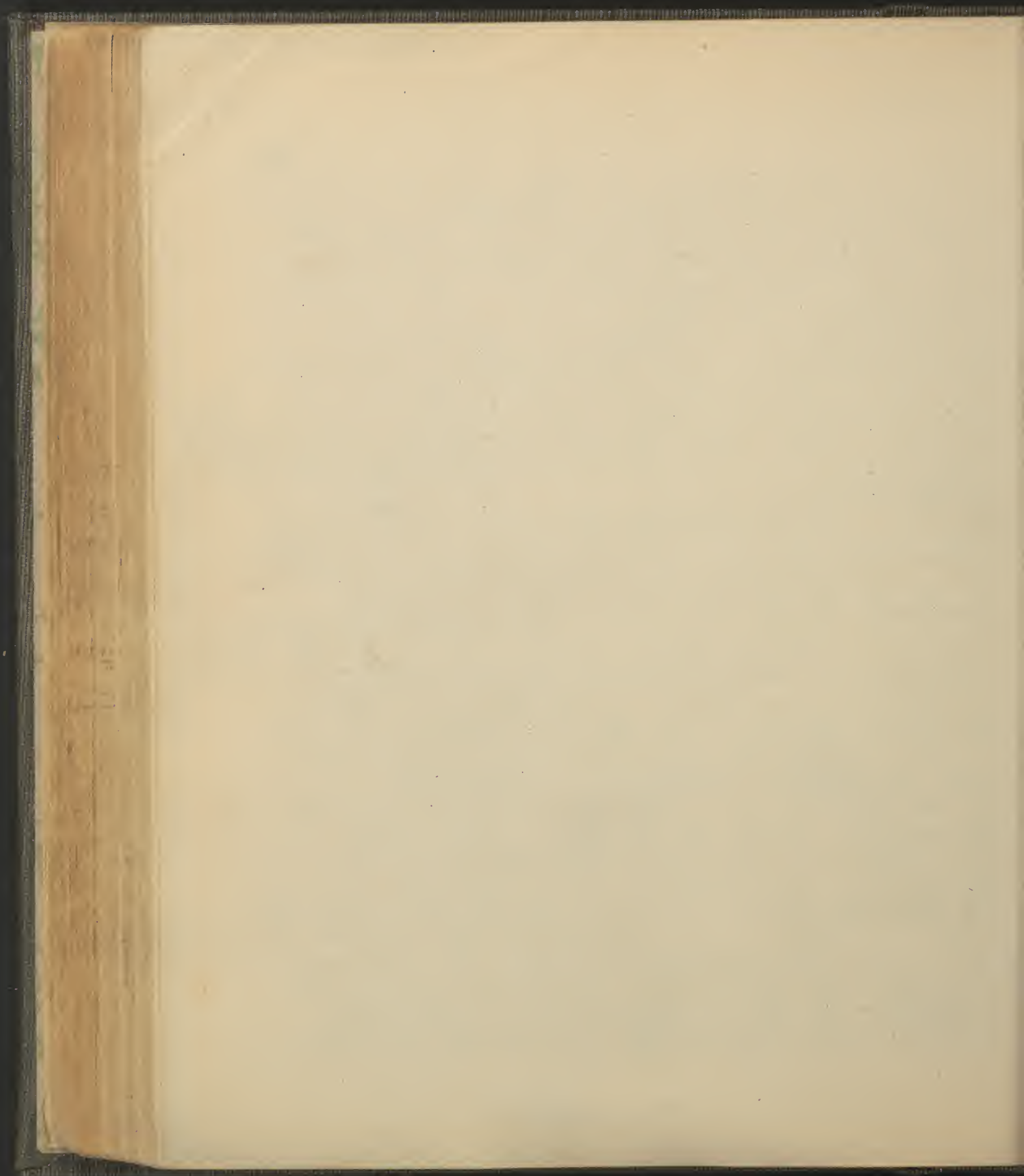
The middle ear or middle chamber or Tympanum lies in the bony portion of the temporal bone separated externally from the meatus auditorius externus by the membrana tympani; separated internally from the internal chamber or labyrinth by a bony wall having its roof to correspond with the depression on the anterior face of the petrous bone, its floor to the jugular fossa of the basilar face of the petrous bone having its anterior wall interposed between it and the internal carotid artery and its posterior wall the cellular substance of the mastoid portion of the temporal bone. The tympanum is much narrower below than above owing to the obliquity of its inner and outer walls the length of its roof from without inward is about two lines the floor being scarcely more than one line. It presents for examination six walls two of which floor and roof have nothing noteworthy, the outer wall has been described as the membrana tympani and besides these walls it presents a chain of small bones between its outer and inner walls. The three walls presenting points of interest are 1st The Internal wall, the bony partition between the tympanum and labyrinth, upon this are seen the



following appearances (a) A ridge at its upper part corresponding to the aqueduct of Fallopius (B) just beneath this a kidney-shaped opening into one of the apartments of the labyrinth called the fenestra ovalis (vestibule) this is closed during by a membrane (and the foot of the stapes);

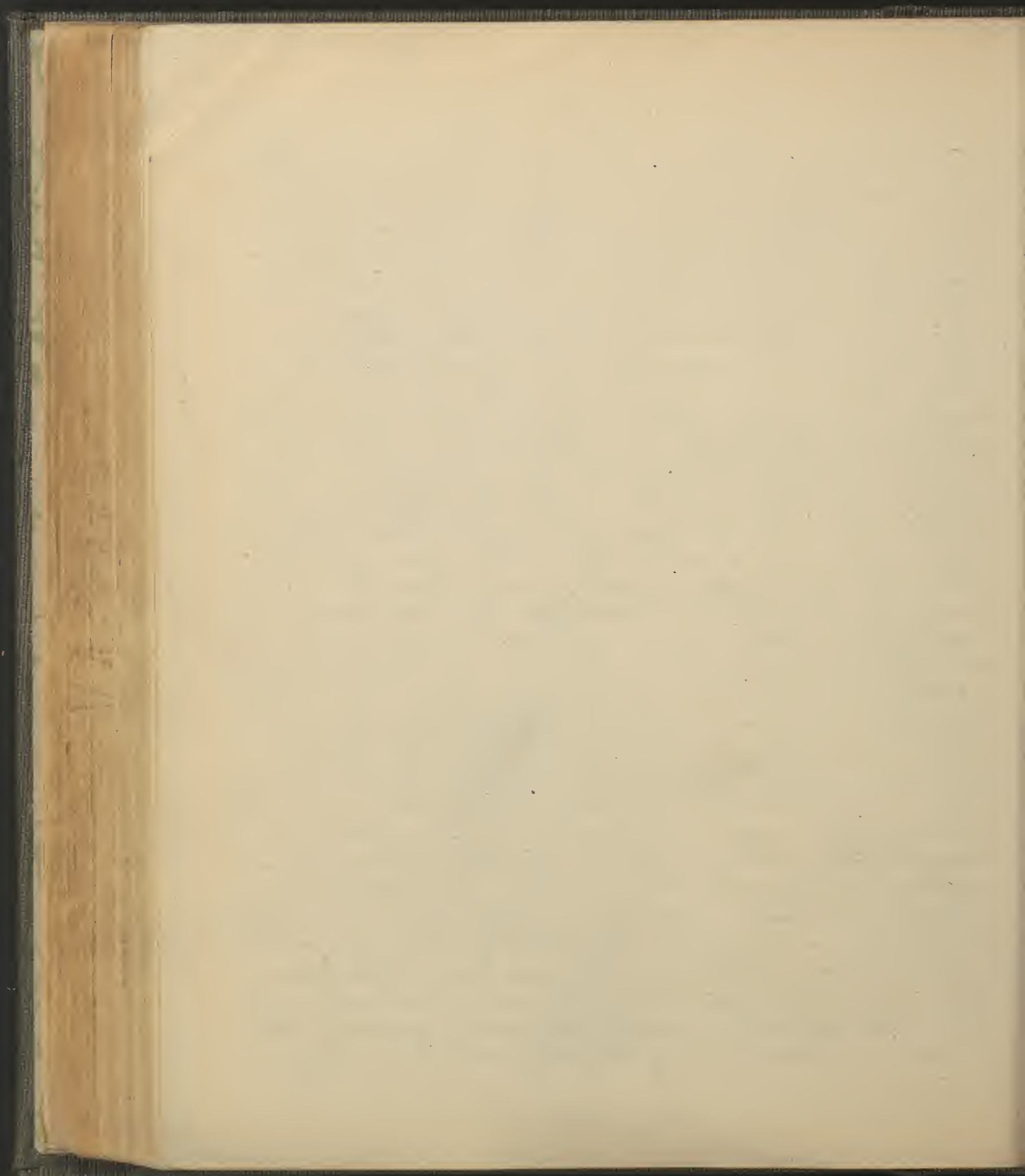
(c) Below this is seen a bulging surface the promontory.
(d) Beneath this is seen a second opening, oval or triangular, called the fenestra rotunda which is likewise closed by a membrane, this establishes communication with another apartment of the labyrinth (the cochlea).

2^d The Posterior wall presents several small openings into the mastoid cells and the opening for the entrance of the chorda tympani, iter chordae posterioris, which crosses the tympanum to gain exit on its anterior wall; there is also seen a conical projection, the pyramid which has at its summit an opening for the stapedius muscle. 3^d On the anterior wall are seen (a) the fissure of Glaser. (B) the opening of exit of the chorda tympani, iter chordae anterioris, or canal of Huguier. (c) two small openings separated by a thin plate of bone the upper is called the opening for the tensor tympani the lower the opening for the Eustachian tube the dividing septum the cochleariform process (vide petrous bone). Stretching across the tympanum from the membrana tympani externally to the fenestra rotunda internally are seen 3 small bones, malleus, incus, and stapes. The Malleus is the outermost of the three bones resting against the membrana tympani externally and articulating with the incus internally. It consists of a head



for articulation with the malleus a neck and 3 processes; one of the processes is called the handle (manubrium) which lies imbedded in the membrana tympani from above downward half way to the floor, another, the long process (processus gracilis) passes downward to the fissure of Glaser - the 3^d process the short process bulges outward from beneath the neck. The Incus is so called from its resemblance to the anvil, it consists of a body for articulation with the head of the Malleus and two processes. The short process passes backward to the opening of the mastoid cells in the posterior wall and the long process descends to articulate with the head of the Stapes terminating by an enlargement called the *ovicula*.

The Stapes (stirrup) projects inward from the *ovicula* with which it articulates by a head, succeeding the head comes a neck and diverging from this are two crura, one to either side which are united at their distal extremity by a connecting plate called the "foot" which is exactly fitted to the fenestra ovalis. These bones are large as ever they are when the child is born, they are held together by ligaments and give attachment to several small muscles which are intended to move the bones on one another and thus relax or tighten the membrana tympani or membrane of the fenestra ovalis. This membrane is in fact composed of two layers and the fenestra ovalis is seen to be closed successively by the following parts from without inward - 1st the mucous membrane of the tympanum. 2^d beneath this is the foot of the stirrup and 3^d on the labyrinthine surface, this foot is coated by the serous membrane lining the labyrinth. The arrange-



ment for closing the fenestra outward - rotunda is somewhat similar in that it consists of three elements - 1st a fibrous membrane coated - 2^d externally by the mucous membrane of the tympanum and 3^d internally by the serous membrane of the labyrinth: and is constructed so much like the membrana tympani that it has been called the membrana tympani secundaria. The ossicula auditus are held to each other in position by means of small ligaments - 1st the head of the malleus is held to the body of the incus by a capsular ligament - 2^d another capsular ligament binds the orbicular and the head of the stapes. The two ligaments serve to bind the bones together: Those holding the bones in position are three in number - 1st The foot of the stapes is held in contact with the fenestra ovalis by means of ligamentous fibres - 2^d there is a suspensory ligament of the malleus consisting of a few ligamentous fibres passing between its head and the roof of the tympanum - 3^d a band of fibres attaches the short process of the incus to the opening of the mastoid cells - These bones thus permitted motion by the ligaments are moved not alone by the vibrations of the membrana tympani but also by two small muscles - 1st The Tensor Tympani which springs from the apex of the basilar surface of the petrous bone the upper aspect of the cartilaginous portion of the Eustachian tube and enters the opening into the tympanum, known by its name and found just above the processus cochleariformis which separates it from the opening of the Eustachian tube it also derives a few fibres from the inner surface of the canal it traverses, when it reaches the anterior wall of the tympanum its ten-

1 1/2 to 2 in in length.

don turns outward and is inserted into the malleus at the junction of the manubrium and long process. 2d The Stapedius is far the smallest muscle in the body. it arises from within the hollow pyramid on the posterior wall of the tympanum emerging from the opening on the summit of the pyramid its tendon is inserted into the neck of the stapes. The action of the stapedius to regulate the pressure of the foot of the stapes against the fenestra ovalis.

- The Eustachian Tube.

The Eustachian tube is a canal which establishes a communication between the air in the tympanum and the outside atmosphere, which does not otherwise exist. It passes from the anterior wall of the tympanum, where its opening is seen just beneath the processus cochleariformis, downward, forward and inward to terminate in the pharynx just behind the opening of the posterior nares. Its lower longer (2/3) portion is cartilaginous, its upper 1/3 are osseous.

- The Internal Ear.

The internal ear or labyrinth is the innermost of the three chambers which constitute the organ of hearing and is intended for the terminal ramifications of the nerve of hearing which reaches it through the internal auditory meatus found on the centre of the anterior face of the petrous bone, and for the reception of the communicated vibrations of the air thro' the tympanum. It consists of an osseous and a membranous labyrinth; the osseous being divided into three chambers which however communicate with

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one another; these three parts are placed one behind the other, the anterior is called the cochlea, the middle the Vestibule the posterior the 3. Semicircular canals. They are all lined by a serous coat.

- The Vestibule -

The vestibule is a three-cornered cavity having communication with the tympanum through the fenestra ovalis. Each of its corners is called a ventricle, and the 3 are anterior, superior and posterior. In the anterior corner are seen the following points - 1st a depression called the Fovea Hemisphaerica - 2^d a number of minute apertures called the Macula cribrosa - 3^d a ridge the crura pyramidalis - 4th the opening into the cochlea (scala vestibule).

The Superior corner, we have 1st a depression Fovea Hemisphaerica - 2^d two openings of semicircular canals - dilated extremities of superior and horizontal. The Posterior corner presents 1st a depression Fovea sulciformis - 2^d The opening of the aqueduct of the vestibule - 3^d The dilated extremity of the oblique semicircular canal the common aperture for this canal and the superior and the opening of the horizontal canal.

- The Semicircular Canals -

The Semicircular Canals are channels hollowed in the petrous bone; they are about $\frac{1}{2}$ in. in diameter three in number and placed at right angles to one another. Each forms rather more than a semicircle and presents near one extremity an enlargement called the ampulla and opens by both extremities into the vestibule. The three canals are called 1st Su-

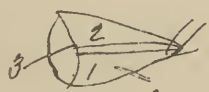
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superior, is vertical in direction and produces the ridge seen on the anterior face of the petrous bone - 2^d The Posterior or Oblique which is also vertical - 3^d The External or Horizontal is horizontal in direction - These three canals present but 5 openings into the vestibule, owing to the fact that the superior and posterior have a common opening into the posterior corner of the vestibule - The other openings have been mentioned in the description of the vestibule - three being into the posterior corner and two into the superior corner -

- The Cochlea -

The cochlea lies in front of the vestibule and by its base forms the promontory seen on the inner wall of the tympanum; when entire it resembles a snail shell and may be described as consisting of a tube divided into two apartments by a longitudinal septum, one end of the tube being closed and the closed end being much smaller than the open from which it rapidly tapers, the septum is not complete for it fails to reach to the small closed end thus allowing a communication between the two chambers. The foregoing may thus be represented

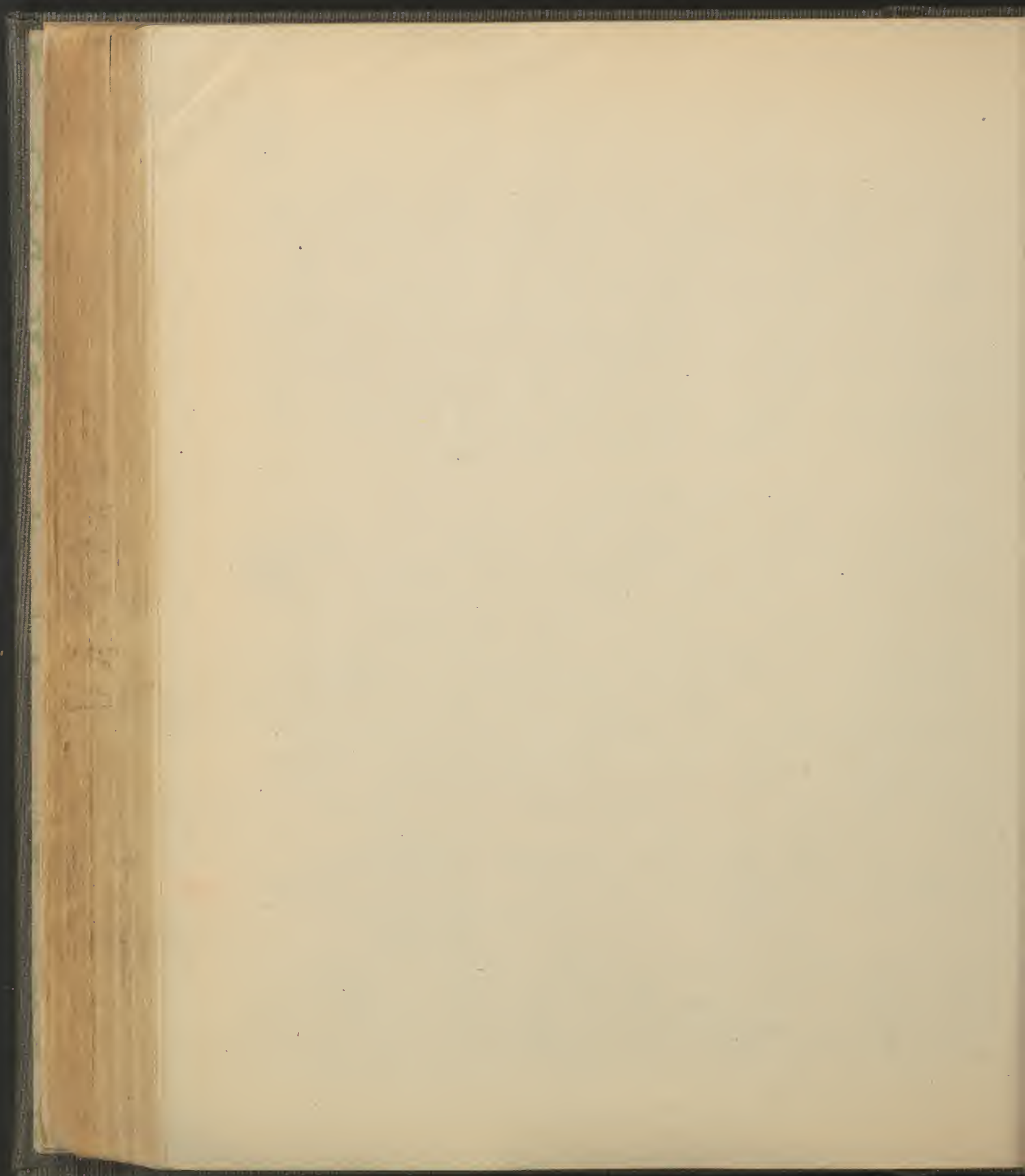
Now in reality this tube is not straight but coiled by two turns and a half



7. Hammer
6. Cupola
4. Helicotrema
5. Lamina spiralis
1. Scala Tympani -
2. " Vestibule -
3. " Media -

around a stem or tapering pillar called modiolus.

The septum dividing the two chambers called scalae, is known as the Lamina spiralis which consists of two layers between which is a narrow space

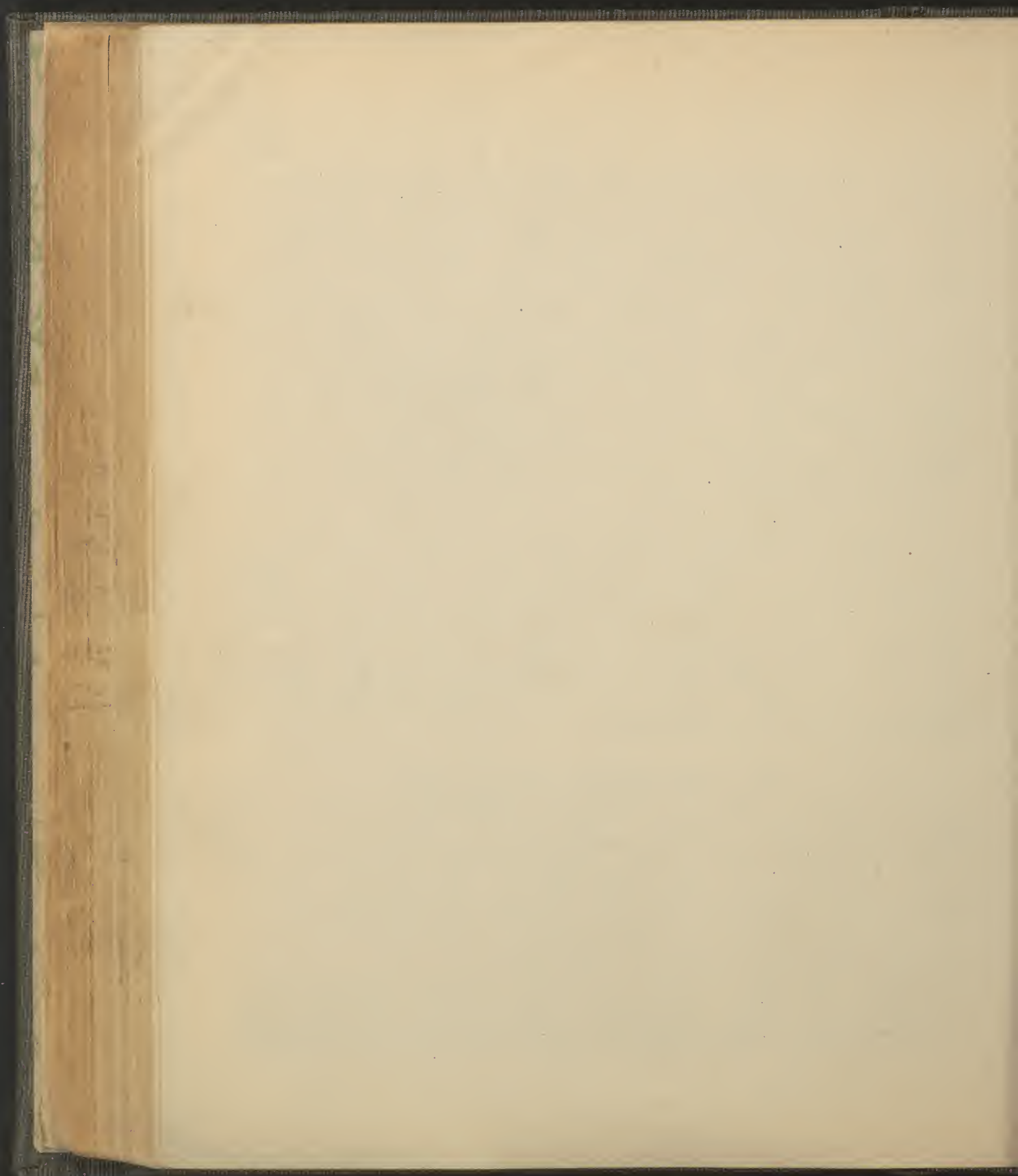


called the *scala media*; the *lamina spiralis* terminates in a hook-like projection called the *Hamulus* - When examined closely the *lamina spiralis* is seen to consist of three structures, the portion next the *Modiolus* is bony, farther out it is membranous and the outermost portion is muscular which is sometimes called the *cochlearis muscle*. The small space existing between the extremity of the *lamina spiralis* and the *cupola* is called the *Helicotroma*, this establishes a communication between the two chambers one of which is called the *scala Tympani*, the other the *scala vestibuli*; at the base of the cochlea, next the vestibule, the *scala vestibuli* is seen to communicate with the anterior corner of the vestibule and the *scala Tympani* to communicate with the tympanum by means of the *fenestra rotunda*. The *modiolus* is the tapering pillar around which the two *scalae* are turned (in the centre of it is a canal called the *tubulus centralis modiolii*) its base is next the vestibule and is called the *tractus spiralis foramina lentis* -

- The *Membrana Labyrinthi* -

Besides the parts above described, the labyrinth contains others for within each of the semicircular canals is a membranous counterpart two-thirds smaller and separated from the bony canal by liquid. The membranous canals present the same dilations and are closed at one end as the bony.

In the vestibule also are seen two membranous sacs one above the other; the upper one receives the openings of all the semicircular canals and lies in the *fovea*



hemis-elliptica (Utriculus or Sacculus) communis).
 (The lower is called utriculus or sacculus proprius).
 In the membranous labyrinth, as the above parts are
 collectively called are found crystalline particles,
 carbonate and phosphate of lime, called ear dust
 (otocorites).

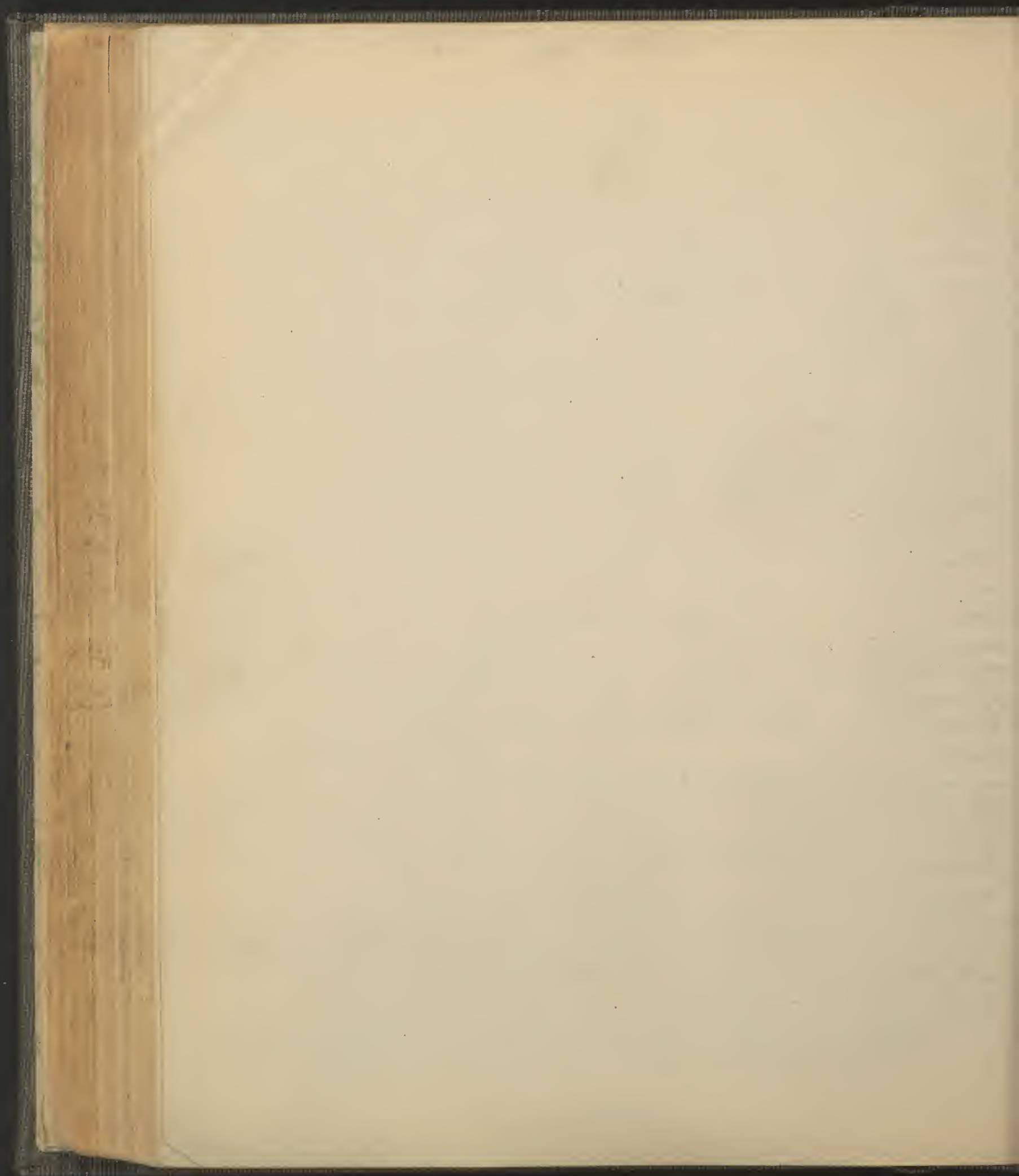
The Auditory Nerve gains the labyrinth through the
 internal auditory meatus, at the bottom it divides
 into a vestibular and a cochlear branch, the latter di-
 vides into filaments which run in channels in the
 modiolus and terminate outward to ramify in the
 lamina spiralis. The vestibular branch divides into
 three, 1 for each of the membranous sacs and one for
 the semicircular canals.

-The Organ of Vision-

The organ of vision is situated in the orbits, two conical
 cavities found on the face. Like the organ of hearing
 it consists of two similar portions one on each side
 called the eye-ball and its appendages.

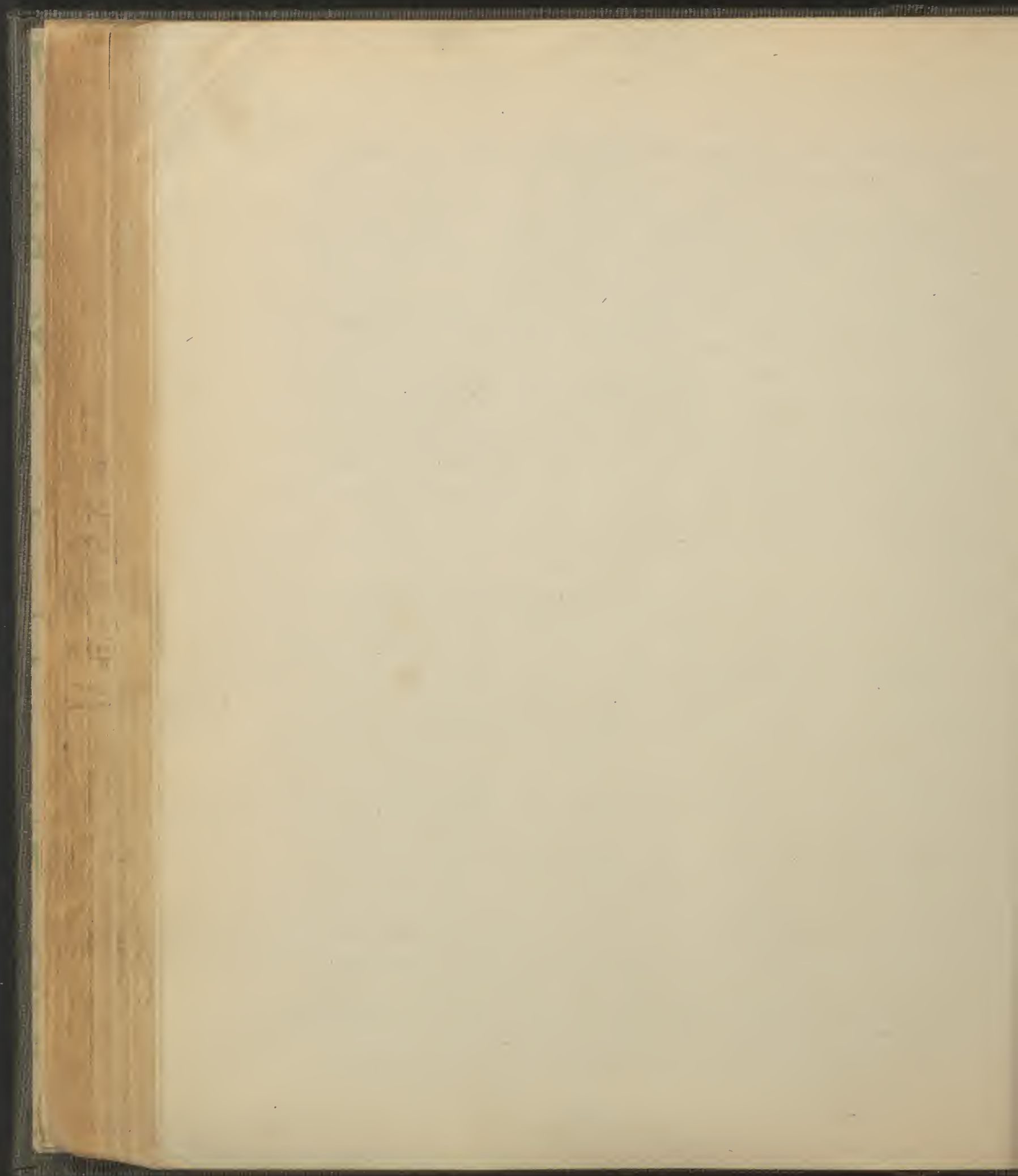
-The Appendages of the Eye-

The appendages of the eye (Annexa oculi) are mere
 accessories to the true organ of vision, the eye-ball, for
 the purpose of protection and ornament. They are
 I. Brow and prominence of the integument curved,
 covered with hair and situated above each orbit.
 They are intended for ornament and protection from
 dust, perspiration and too vivid light and to break
 the force of a blow falling on the front of the orbit.
 II. The Eyelids consist of two movable curtains which
 are constantly playing over the front of the eye-ball.



The aperture which separates the two lids, one called upper (superior palpebra) the other lower (inferior palpebra) is known as the palpebral fissure and can be extinguished or dilated at pleasure. The two lids meet externally at an acute angle called the external canthus, internally when they seem about to meet they refrain from doing so and the interval between is prolonged inward towards the nose for some distance before forming the internal canthus; the triangular space thus left between the two lids at the inner canthus, is called the lacrimal lake (lacus lacrimalis), in which is seen a conical reddish projection called the caruncle; bounding the caruncle externally is a curved fold of mucous membrane, called the flica semilunaris (its concavity is external.)

At the commencement of the lacrimal lake, just where the two lids are apparently about to unite is seen a projection from the free edge of each lid called the lacrimal papilla (tubercle) upon the summit of each of which is seen a minute aperture the lacrimal foramen - The free edge of each lid is provided with several rows of curved short hairs the eye-lashes, intended for ornament to render the contact of the lids more intimate, and for protection from dust, etc. In structure the eye-lids consist of the following parts, externally there is a layer of thin brown skin with subsequent areolar tissue, internally of mucous membrane called the conjunctiva which not alone lines the inner surface of the lids but is reflected over the front of the eye-ball (palpebral and ocular portions); the palpebral portion is studded with



Lapillae; just beneath the integument on the outer surface of the lid is found a pale thin muscle the orbicularis palpebrarum, as named from the fact that it is somewhat round passing from one lid to the other and surrounding the palpebral fissure; its function is to close the lid. Beneath the orbicularis palpebrarum in each lid is found a curved plate of cartilage, the tarsal cartilage, about an inch in length.

The superior is the larger and is semilunar in shape, the inferior is much the narrower being oval. The two are attached along their circumference to the edge of the orbit by ligamentous fibres externally they are held to the outer angle of the orbit by a ligament, external palpebral (tarsal) ligament - internally they terminate in a ligament called the tendo oculi which holds them to the edge of the orbit. Lying on the posterior surface of the lids between them and the conjunctiva and opening on the edge of the lids, are seen a number (30 in the upper lid, fewer in the lower) of vertical beaded bodies the meibomian glands, their secretion being discharged on the edge of the lid.

III. The Lachrymal Apparatus - Lying on the depression, seen on the orbital plate of the frontal bone just behind the external angular process is found the Lachrymal gland about the size and shape of almonds, resting on the posterior part of the upper tarsal cartilage, the ducts from 7-12 in number, which convey the secretion of the gland (tears), are seen to open on the posterior surface of the upper lid just beneath the gland. The secretion of this gland, the tears, being discharged on the surface of the conjunctiva is conducted by a duct towards the internal canthus of the eye by

1888-9 gar
measured to 2
follows -
1 1/2 in Anterior portion
diameter
1 in transverse
=

The frequent movements of the lids, then it disappears in the lacrimal fovea from each of which there leads a small channel, called lacrimal canaliculi; the upper one first ascends then bends inwards to terminate in a duct, called the nasal duct or lacrimal duct; the lower canaliculus first descends from the fovea and then turns inwards to terminate beside the superior in the nasal duct. The nasal duct extends a little way along the entrance of the canaliculi and then forward is called the lacrimal sac; from this the duct extends downward (backward and slightly outward) to terminate in the inferior meatus of the nostril.

The Globe of the Eye.

The eye ball is situated in the front part of the orbit imbedded in a mass of fat. It is nearly globular its anterior posterior diameter one inch and its transverse diameter being $\frac{1}{2}$ of an inch. It receives anteriorly the optic nerve, at a point about $\frac{1}{10}$ of an inch to the nasal side of its centre.

On dissection the eye-ball is seen to consist of several concentric layers enclosing a bag of liquid which forms about $\frac{4}{5}$ of it. These coats or layers are sclerotic choroid and retina.

The Sclerotic Coat.

The sclerotic is familiarly known as the white of the eye and is a dense fibrous membrane serving as a protecting envelope for the rest of the eye-ball. Its anterior $\frac{1}{6}$ is seen to be wanting the aperture being filled by a transparent membrane, the cornea. Posteriorly

The Sclerotic in front - not attached -
of muscles which move the eye - here
we find Sclerotic is thickened.

Sclerotic is
thicker behind

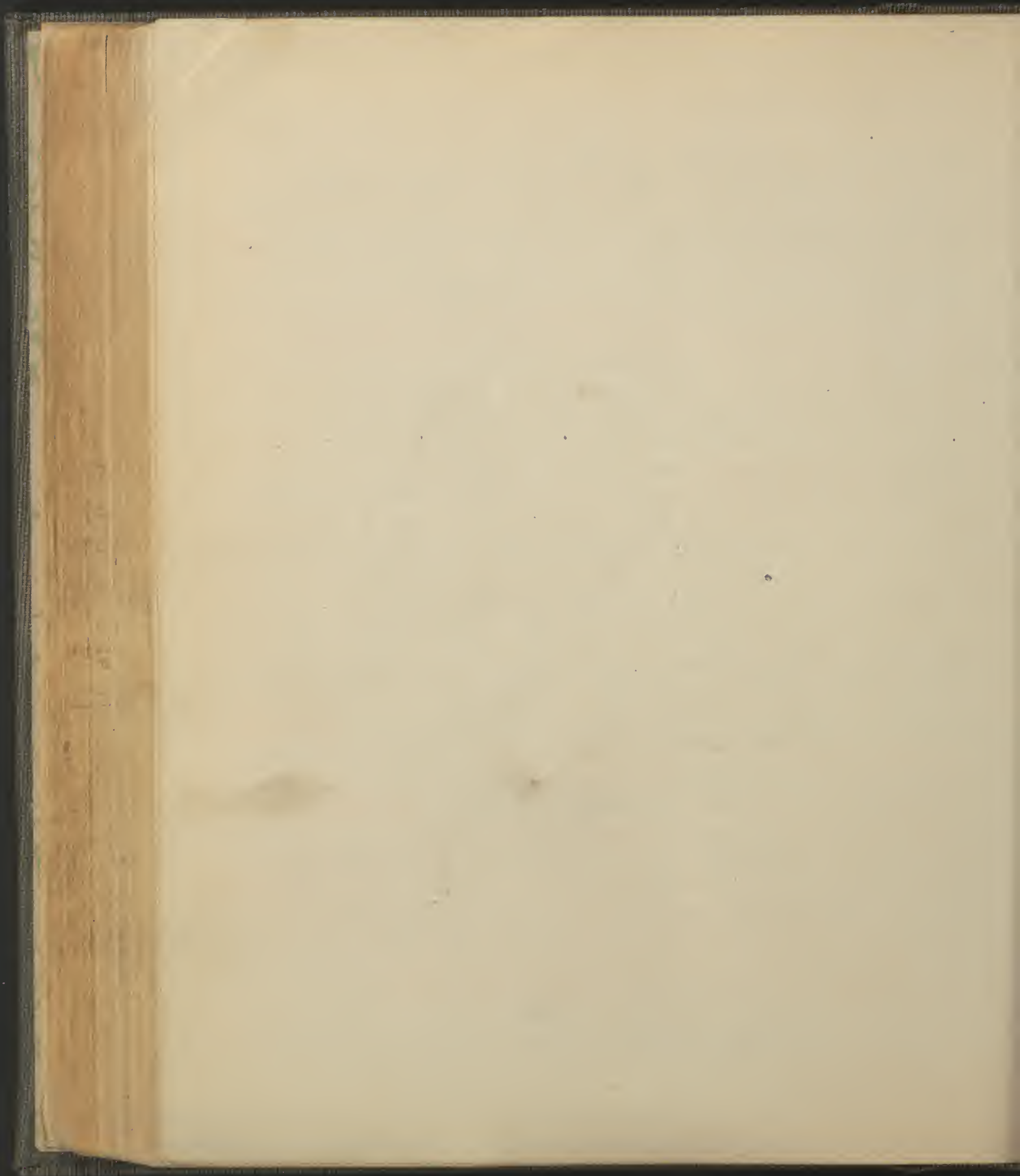
The back of cornea forms ant-boundary of -
anterior chamber of eye.

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the sclerotic is perforated by the optic nerve, not on
margin, but the nerve splits into fibres thus producing
a number of apertures and this appearance is called
the macula cribrosa (Lamina C) the fibrous sheath
of which becomes continuous with the sclerotic; near
the termination of the
it is the choroid coat, called Lamina fusca Connective tissue hold

- The Cornea - ✓

The cornea forms the anterior $\frac{1}{6}$ of the first investment
of the eye-ball; it forms the segment of a smaller
sphere than the sclerotic, being more convex it causes
the preponderance of the anterior-posterior diameter of
the eye-ball. The cornea instead of being opaque like
the sclerotic is transparent and its circumference
is received beneath the anterior bevelled edge of the
sclerotic with which it is continuous in some of its
structure. It consists of 5 layers its anterior surface
is an epithelial layer derived from the conjunctiva,
its posterior layer is also epithelial - the lining mem-
brane of the anterior chamber - Next each of these is
found a layer of elastic tissue these two layers of
elastic tissue constituting what is called the elastic
cornea and separating these is a layer of fibrous tis-
ue called the cornea propria, which can be split
into 60 layers formed of spindle-shaped cells with
branching intervals in which circulate the color-
less plasma of the blood - It is with this cornea
propria that the sclerotic is continuous - The cornea
is of varying convexity in different people and



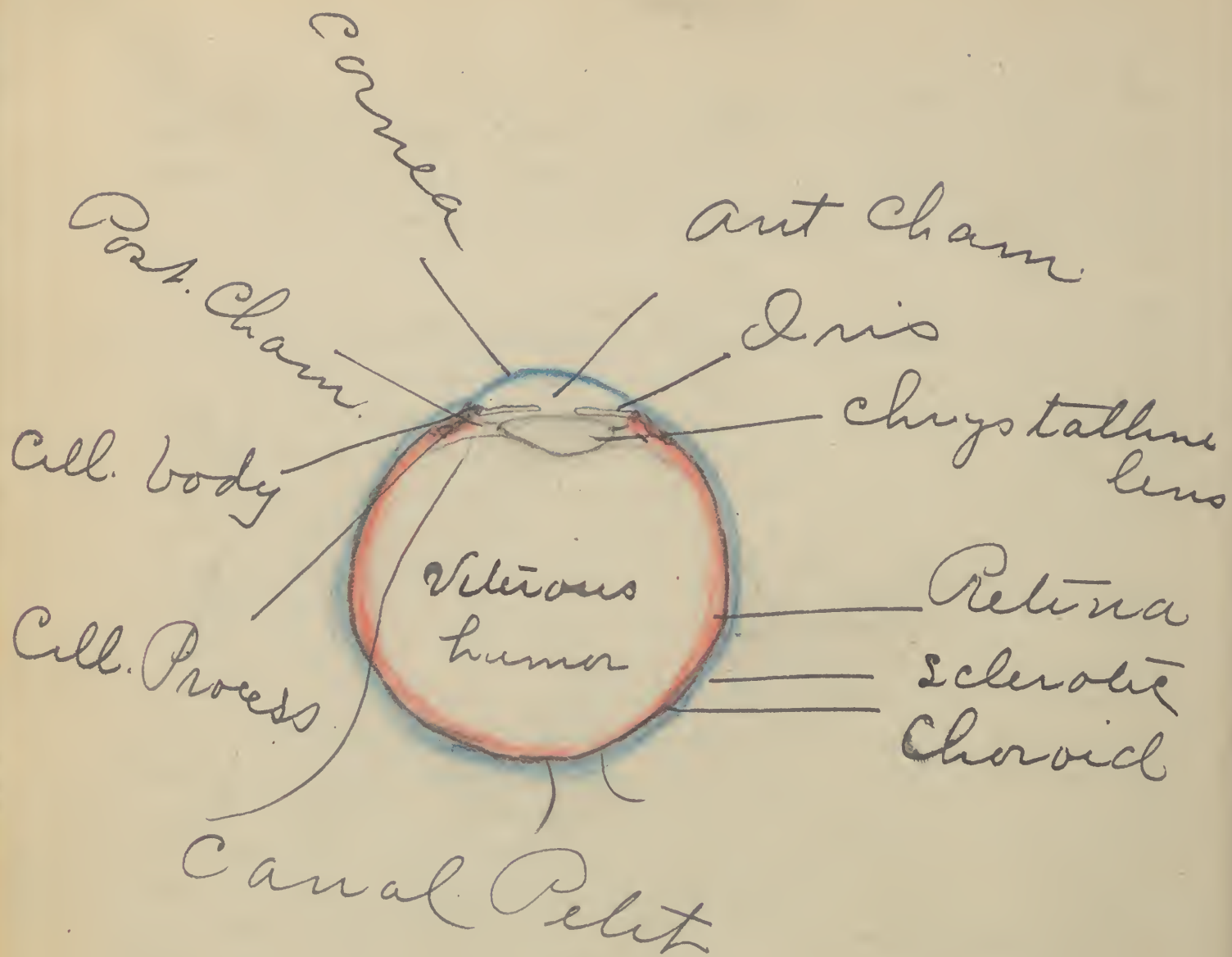
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at different periods of life, it is more convex in youth and becomes much less as in old age; at the latter age there is often seen around the rim of the cornea a yellowish band called arcus senilis -

-The Choroid-

The choroid lies within the sclerotic to which it is connected by angular tissue, which is sometimes called lamina fusca and is pierced posteriorly by the optic nerve. At the same point in front where the sclerotic ceases the choroid terminates in a flat membrane the iris which in its centre presents a round aperture the pupil. The choroid consists of three layers the two outer are red the inner is black between these i.e. the inner of the two red and the black, some make a fourth layer membrana limitans. The external layer is called the venous muscular layer the inner red layer capillary 'arterial' layer or the Ruyshian tunic. The internal layer or membrana pigmenti or tapeta is of a black color consisting of cells filled with coloring matter. On the anterior surface of the choroid just around its inner margin is seen a whitish band $\frac{1}{40}$ in wide, the ciliary ligament which binds together the cornea and sclerotic, and the choroid and iris; Extending back about $\frac{1}{8}$ of an inch on the anterior aspect of the choroid is a gray circular band the ciliary muscle. On the posterior aspect of the front of the choroid are seen about sixty ridges diverging from the rim of the choroid and called the ciliary processes.

-The Iris-



Iris

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The iris is the thin flat membrane which continues the choroid in front. In its centre is seen the opening called the pupil. - The various colors of the iris are due to the difference of color of the pigmentary matter in the cells, continued in it and to varying arrangement of its blood-vessels.

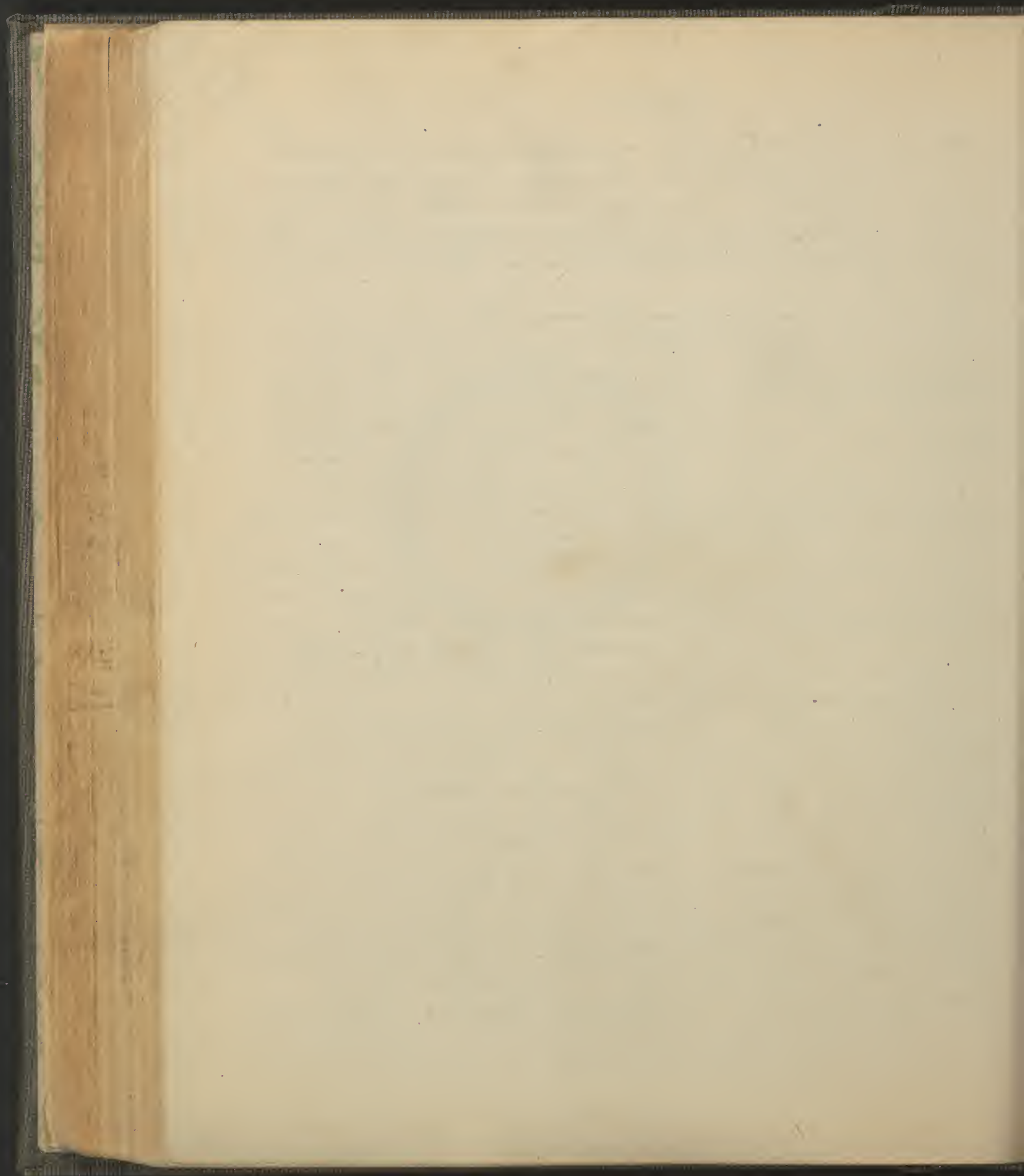
The color is darkest usually near the centre.

Towards the middle of the iris is a circle of little shaggy projections. - The foundation of the structure of the iris is fibrous tissue, which consists of radiate and circular fibres, interspersed through which are pigment cells; in front and behind this fibrous layer is a layer of these pigment cells. In the iris are also seen striated muscular fibres, circular, around the pupil; and radiating towards the circumference:

- by the action of these fibres the pupil is constantly dilating and contracting. - Blood vessels and nerves ramify throughout these structures. On the posterior surface the iris is seen to consist of a black layer the uvea, which is in fact a continuation of the membrana pigmentosa of the choroid.

Anterior Chamber - Between the iris and pupil behind and the posterior surface of the cornea in front is a small cavity called the anterior chamber.

Posterior Chamber - Between the iris and pupil in front and the lens behind is another smaller cavity the posterior chamber these two contain a liquid called the aqueous humor; and they communicate through the pupil after the eighth month of foetal life, up to which time the pupil is closed by a membrane called the pupillary. (Both chambers are lined by a membrane, the secreting membrane of the aqueous



humor.)

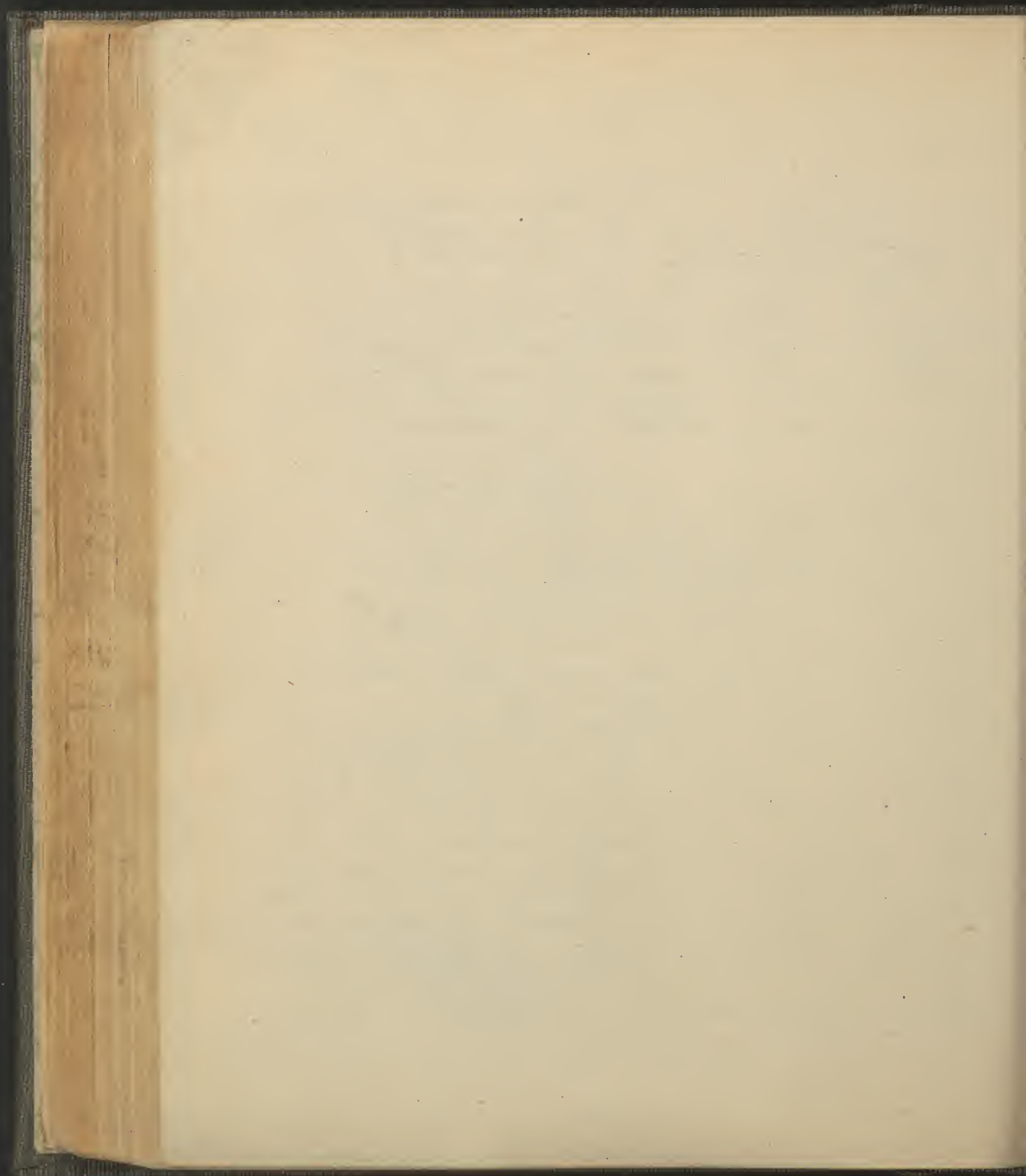
The Retina.

The retina is the innermost of the 3 tunics of the eye lying just within the choroid. It is wanting for a greater distance even than the two preceding tunics, for it ceases as it reaches the ciliary process and is a rough jagged margin called the *trabecula* and is continued hence to the crystalline lens by a vascular membrane called the *suspensory ligament* of the lens; the outer surface of this membrane is fluted in correspondence with the ciliary processes against which it rests.

The Retina is very sensitive and translucent being partially formed by the expansion of the optic nerve with which it is continuous posteriorly.

Exactly in the centre posteriorly is a yellowish round spot called the *lunula lutea* and in the centre of this spot a depression called the *fovea centralis*; about $\frac{1}{10}$ of an inch to the inner side of this is seen the termination of the optic nerve (optic disk or *papilla*) showing in its centre the *arteria centralis retinae* breaking up into branches from this point forward the retina gradually thins to its termination.

The Retina may be divided into two layers which however may be thus stated 1st externally is a thin layer (of cells) called *Jacobi's membrane*. 2^d a transparent homogeneous thin layer a *membrana limbalis*. 3^d a series of granular layers. 4th three layers nervous in structure furnished by the optic nerve partially fibrous and partly ganglionic. 5th the vascular layer consisting of the ramifications of the *arteria centralis retinae*. 6th another *membrana*



the arteria centralis retinae. 6th Another Membrane
limitans.

Besides these which are found in the order stated,
from without inward, there are found a number of
fibres traversing the retina from without inwards
and as it were binding its layers together these are
known as the radiating fibres of Müller.

The Vitreous Humor.

Just within the retina is a bag called the Hyaloid
membrane containing a liquid called the vitreous
humor which is a similar, in composition to the
aqueous humor 99 per cent being water. - In the
centre of this in the foetus is found a branch of
the arteria centralis retinae making its way to the
lens and called the ciliary artery which disap-
pears at birth.

The Crystalline Lens.

Indenting the front of the hyaloid membrane is found
a double convex transparent body called the crys-
talline lens its posterior surface is much more con-
vex than its anterior the other surfaces being the poste-
rior wall of the posterior chamber though it forms but
a portion of that wall the most bulging portion, the
circumference of the wall being formed by the capsulo-
lar ligament of the lens which extends from the rim
of the lens to the anterior face of the rim of the
lens this ligament (2) can be split into two layers
and when it lays hold of the lens leaves a circular
canal around the lens called the canal of Petit.
The lens is invested by a transparent homogeneous

In giving names on exam either
give their relations to each other or
give order of Association.

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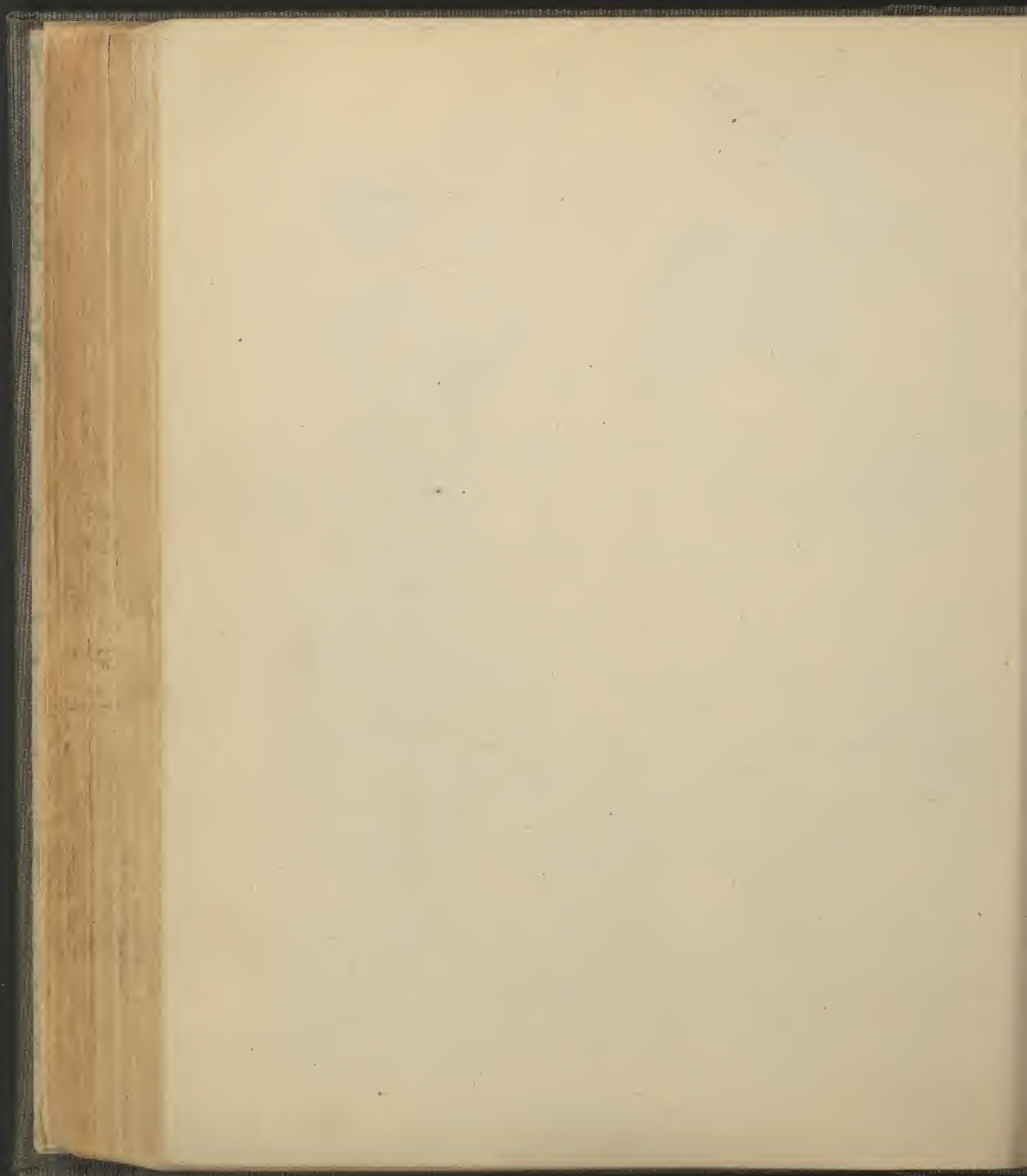
lentic membrane the capsule of the lens. In structure the lens consists of a series of concentric layers (of parallel fibres) gradually hardening towards the centre of the lens. It can also be split into three triangular segments meeting by their apices in the centre of the lens.

In youth the lens is more convex and much softer than in old age as it gradually becomes with advancing age firmer and less convex.

The Muscular System.

When an incision is made into almost any part of the body the following parts are met with successively from the surface inward - 1st skin - 2^d superficial areolar fascia whose existence allows the free movement observed in almost every part of the integument. This superficial fascia consists of two layers, the outer of which generally is found a quantity of fatty tissue varying in amount in different parts of the body. 3^d Beneath the superficial fascia in some parts are found the muscles with their proper investing fascia; while in others there is interposed between the muscles and superficial fascia a strong and more or less thick membrane the deep fascia which frequently gives off from its inner aspect partitions which pass into separate different groups of muscles).

The action of muscle is to produce movement; the most of them being attached to bones, some however have no bony attachment and others are only attached to bone by one extremity the other being inserted into some of the soft tissues. Now when a



muscle is attached to bone by both extremities, a movable joint is almost invariably found between its two points of attachment - otherwise, little or no movement would occur when the muscle attempted to contract - as that is a rule, those muscles which have attachment to bone at both extremities lay hold of a different bone at either extremity - The two attachments of a muscle are called the one its origin the other its insertion; the origin being that attachment which is susceptible of less motion than the other attachment which is the insertion; and as a rule especially true of the limbs, the origin is the attachment nearest the body or the middle line of the body - The actions of a muscle consist in the shortening of its length - thus drawing the parts to which it is attached nearer, either by moving the parts to which both extremities are attached, or generally by moving but one, its insertion, and thus are produced the movements of the body or its parts, some of these motions being so complex that they cannot result from the action of one muscle but are the effect of the coordination of the actions of many muscles -

The striated muscles are the red, fleshy portions of the body though generally a muscle consists of two portions, the red muscular fibres which are gathered into bundles or fasciculi of greater or less size thus producing a coarse or a fine muscle and of a white tougher stronger portion called its tendon which with few exceptions is found at the extremities of the muscle and being much stronger than muscular fibre bulk for bulk, the tendon is the smallest part of the muscle and thus space is economized at the attach-

Orbulat group -

Orbulatus planulum

Carringtoni Superficialis

Tenisoni Tarsi

Locust Planulum.

ments; the portion of the muscle between its tendinous origin and insertion is called the belly of the muscle and in a few instances a muscle has two bellies since it becomes tendinous in its centre.

The names of most muscles are derived from one of the following facts; a muscle is named 1st from the origin it occupies - 2^d from its shape - 3^d from the direction of its fibres - 4th from its attachments - 5th from its action - or 6th from the number of its origins -

- The Muscles of the Face -

The muscles of the face are arranged into groups connected with the orbit, with the nose, with the mouth and a very unimportant group connected with the ear.

Palpebral -

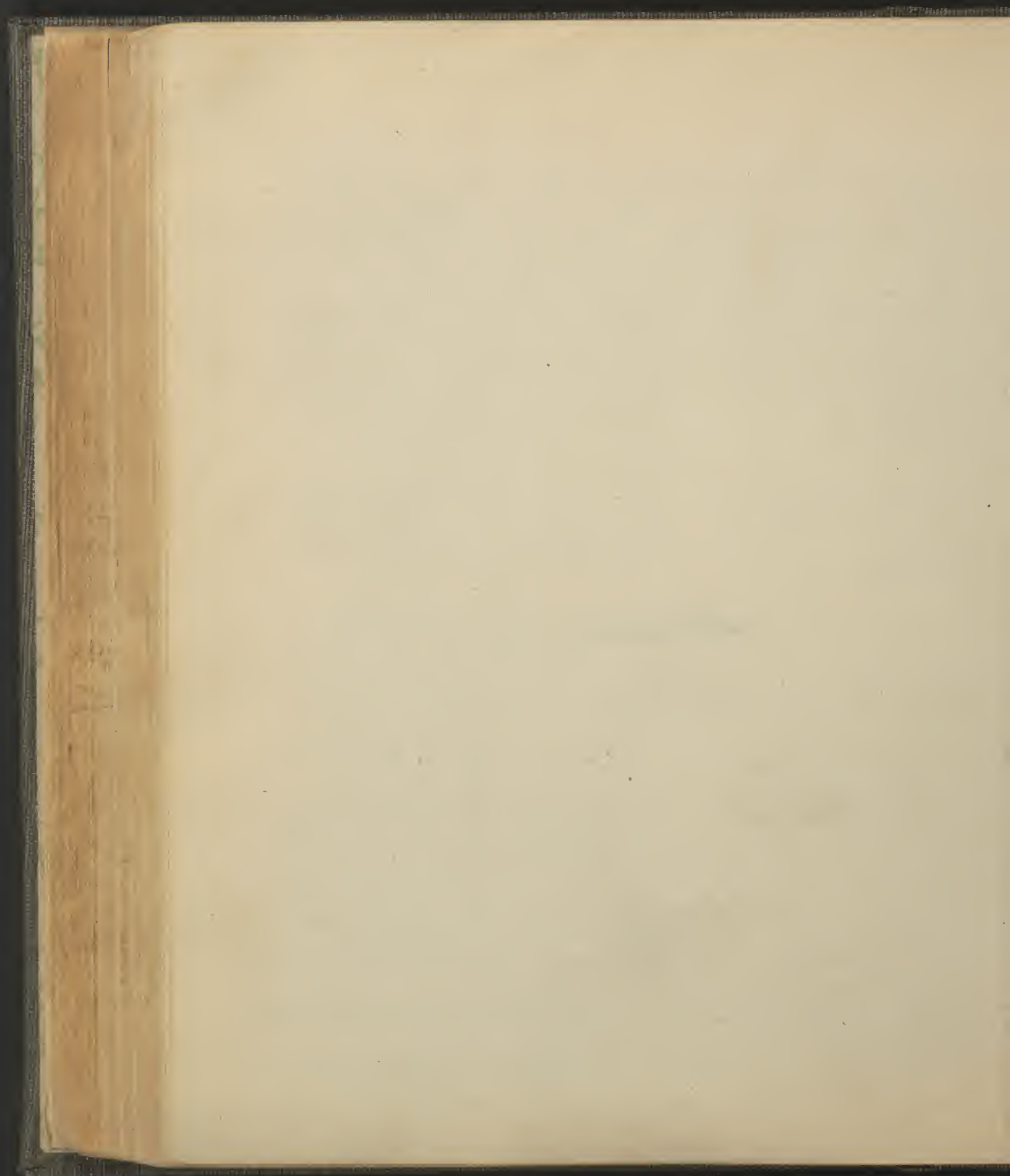
- Orbital Group - Three Muscles -

Orbicularis Palpebrarum -

The orbicularis palpebrarum is an elliptical muscle lying just beneath the skin in front of the orbit, the portion which lies on the lid being thinner and paler than the rest. It arises, or is attached, internally (to) the tendo oculi and adjacent bone and the fibres forming an ellipse around the eye lids and orbit return to the point from which they started. (The tendo oculi is a tendinous cord which is attached by one end to the orbital aspect of the nasal process of the superior maxilla while the other end bifurcates to be attached to the inner extremities of the tarsal cartilages.)

Externally the orbicularis palpebrarum is attached to the temporal fascia.

Action - It closes the eyelids - It is one of the sphincter muscles but differs in action from most of these in



that being immovably attached at the two extremities of its ellipse when its fibres contract they bring the two segments together in a line connecting its opposite points of attachment whereas most sphincter muscles close the aperture they surround by an approximation of all their fibres at the same time and in the same proportion towards the centre of the aperture; e.g. the sphincter muscle of the mouth the orbicularis oris in the act of shutting a vice it has no bony attachment.

- Corrugator Supercilii -

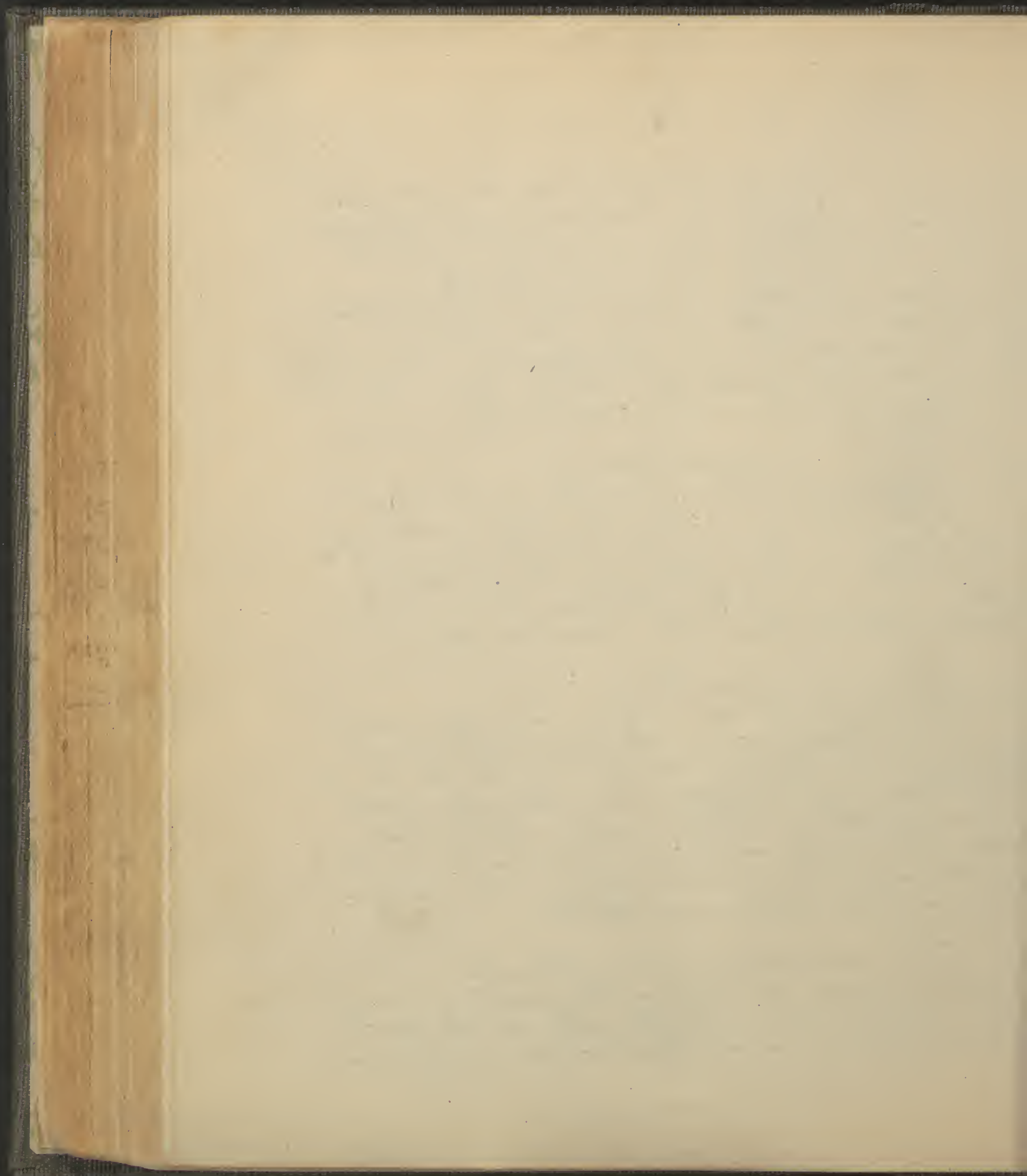
The corrugator supercilii is a small muscle which arising from the inner extremity of the superciliary ridge of each side passes outward on the same side to be lost in the deep face of the orbicularis palpebrarum. - Action - It is a corrugator of the brow, that is it throws the skin of the forehead into vertical wrinkles.

- Tensor Tarsi -

The tensor tarsi, or Homer's muscle, is a very small muscle which arising from the orbital surface of the lachrymal bone passes outward to divide into two portions which lay hold of the inner extremities of the lids, as far outward as the punctum lachrymale. - Action - It aids the orbicularis palpebrarum in closing the lids and also draws the punctum lachrymale inward the better to receive the tears.

- The Inner Group - Seven Muscles -

The seven muscles which form this group we found in the orbit they all except the fifth one, the levator palpebrae superioris are attached to the eyeball and

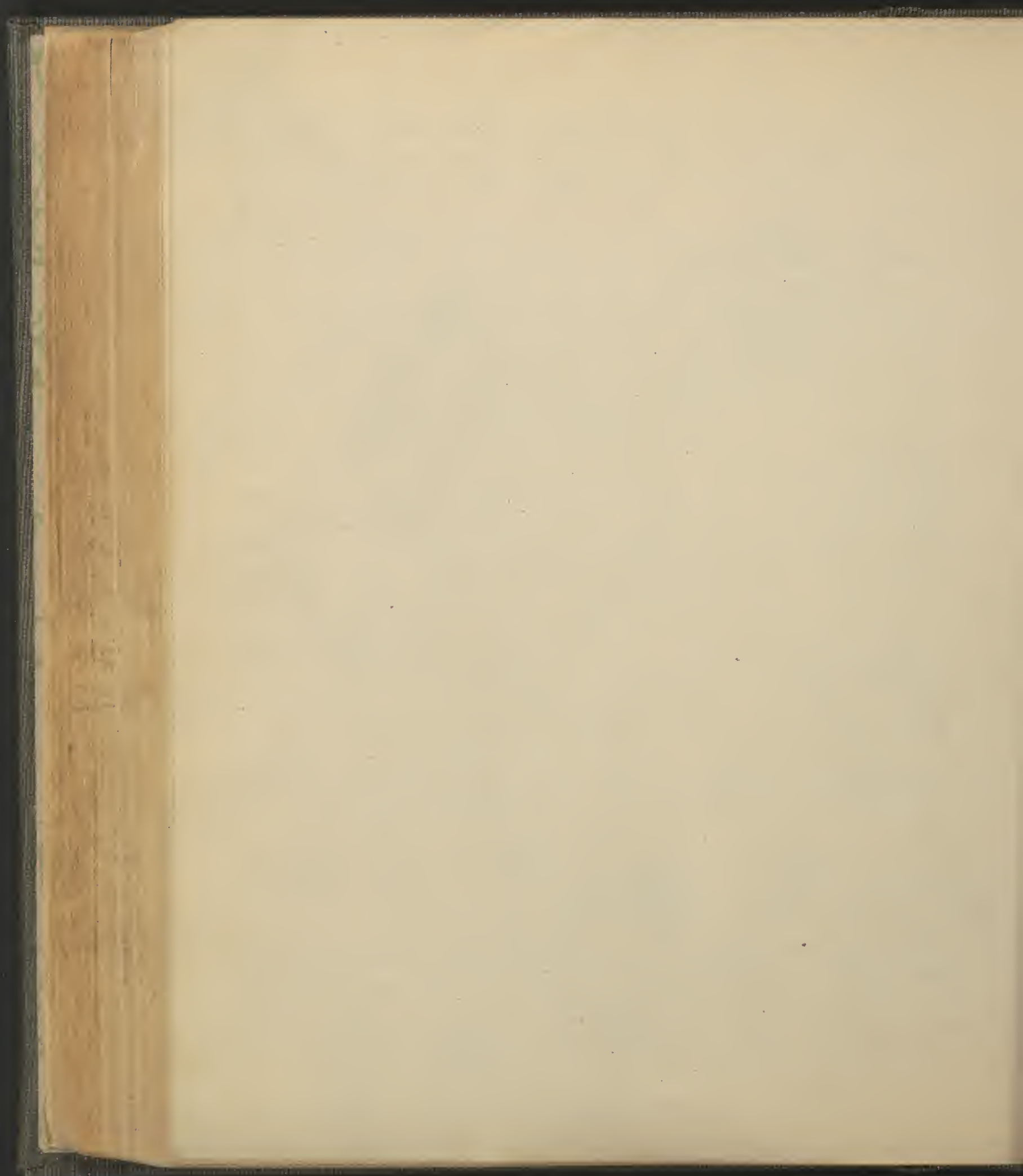


muscles all except the last two, the two oblique muscles, arise at the apex of the orbit and pass forward flat straight and widening as they advance to their insertions.

Four of these muscles are called Recti from the direction of their fibres and are concerned in movements of the eye ball, they are distinguished as 1st the superior rectus because it lies above the globe of the eye and by its action draws the front of the eye upward - 2^d the inferior rectus because it lies below the eyeball and brings the front of it downward - 3^d the external rectus because it lies external to the eyeball and draws its front outward and 4th the internal rectus because it lies internal to the eyeball and draws its front inward. By a combination of the actions of these the front of the eyeball can be moved in all intermediate directions between those above-mentioned. All the recti arise from the apex of the orbit that is from the margin of the optic foramen and also receive each an origin from the fibrous sheath which envelops the optic nerve; they run forward and are inserted into the sclerotic coat about $\frac{1}{4}$ of an inch behind the circumference of the cornea. Some say that 3 of these muscles arise not from the margin of the optic foramen but from the ligament of Zinn which is a fibrous band attached around the lower portion of the circumference of the optic foramen; this however is an unnecessary refinement. These muscles differ very slightly in size and length.

- Superior Rectus -

The superior rectus arises from the upper margin of the optic foramen and from the fibrous sheath of the op-



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tic nerve and passing forward is inserted into the upper aspect of the sclerotic coat about $\frac{1}{4}$ of an inch behind the circumference of the cornea - It is the thinnest of the recti -

-- Inferior Rectus --

The inferior rectus arises from the lower margin of the optic foramen and from the sheath of the optic nerve and passing forward is inserted into the under aspect of the sclerotic coat about $\frac{1}{4}$ of an inch behind the circumference of the cornea -

-- External Rectus --

The external rectus arises by a forked origin from the outer margin of the optic foramen and from the sheath of the optic nerve and passing forward is inserted into the outer aspect of the sclerotic coat about $\frac{1}{4}$ of an inch behind the circumference of the cornea - It is important to remember its forked origin since many nerves pass through the interval between its heads -

-- Internal Rectus --

The internal rectus arises from the inner margin of the optic foramen and sheath of the optic nerve and passing forward is inserted into the inner aspect of the sclerotic coat about $\frac{1}{4}$ of an inch behind the circumference of the cornea -

-- Levator Palpebrae Superioris --

Lying just beneath the roof of the orbit and between it and the superior rectus is a muscle closely con-

Indens as it runs -

Sign of down the direction of penic. when around
the inf. edge of apical foramen.

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The recti, called the levator palpebrae superioris, since its action is to raise the upper eyelid. It arises from the upper margin of the optic foramen and from the sheath of the optic nerve and passing forward is inserted into the upper edge of the superior tarsal cartilage. ant-face.

- Inferior Oblique -

The inferior oblique muscle of the eye is narrow and thin arising from the orbital surface of the superior maxilla near the inner side of the orbit it passes outward beneath the eyeball and inferior rectus to be inserted into the sclerotic near the entrance of the optic nerve, on the outer, under aspect of the eyeball.
Action - It rotates the eyeball on its antero-posterior axis -

- Superior Oblique - (Trochlearis) -

The superior oblique muscle of the eye arises from the inner margin of the optic foramen and sheath of the optic nerve and passes forward along the upper inner wall of the orbit to the front of the orbit its inner angle where becoming tendinous it plays through a cartilaginous ring fixed to the foramen trochlearis, thence its tendon passes outward and backward beneath the superior rectus to be inserted into the sclerotic coat on the outer aspect of the eyeball about half way from the circumference of the cornea to the entrance of the optic nerve.

Action - its action is computed from its pulley at the foramen trochlearis, hence it rotates the eyeball on its antero-posterior diameter and draws it forward.

- Muscles of the Mouth -

The muscles of the mouth consist of two groups, superior

and inferior labial groups and one muscle the orbicularis oris which belongs to both groups - 177

- Orbicularis Oris -

The orbicularis oris is the sphincter muscle of the mouth having but slight attachment to bone this may be disregarded - It consists of two segments one in each lip which meet and interlace at the angles of the mouth -

Action - It can close the mouth in two ways, either by bringing the lips together in a horizontal line, or by approximating the angles of the mouth at the same time with the lips -

- Superior Labial Group - Five Muscles -

- Levator Labii Superioris alaeque Nasi -

The levator labii superioris alaeque nasi arises from the nasal process of the superior maxilla and descending divides into two slips, one of which is inserted into the ala of the nose while the other continues on to be lost in the upper lip - Its name indicates its action -

- Levator Labii Superioris Proprius -

The levator labii superioris proprius arises from the alveolar ridge of the superior maxilla and descends to be inserted into the upper lip - Its name indicates its action -

- Levator Anguli Oris -

The levator anguli oris (or carmine muscle) arises from the carmine fossa of the superior maxilla and

Superior Vascular Group

1 artery

1 vein

Elevated Lateral Superior

3 muscles

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hairs downward and inward to be inserted into the angle of the mouth. Its name indicates its action.

- The Zygomatic Muscles. Two.

The zygomatic are two small muscles which arise from the zygomatic process and malar bone and pass downward and inward, the zygomaticus major the lower one to be inserted into the angle of the mouth and the zygomaticus minor to be inserted into the upper lip. (action - They carry the angle of the mouth upward and outward.)

- Inferior Labial Group. Three Muscles.

- Quadratus Mentis.

The quadratus menti, or depressor labii inferioris, is a square shaped thin muscle which arises from the oblique line on the front of the lower jaw near the symphysis and passing upward is lost in the lower lip. Its synonyme indicates its action.

- Triangularis.

The triangularis, or depressor anguli oris arises by its base just external to the preceding and is inserted by its apex into the angle of the mouth. Its synonym indicates its action.

Levator Labii Inferioris.

The levator labii inferioris lies just beneath the mucous membrane; it arises from the incisive fossa of the inferior maxilla and is inserted into the integument of the chin. Its action is indicated by its name.



(-Cranial Group - One Muscle-)

- Occipito-frontalis-

The occipito frontalis of either side arises from the superior curved line of the occipital bone and mastoid process. At its origin it is tendinous but passing forward it soon becomes fleshy and then as it is inserting over the vault of the cranium it forms a broad aponeurosis and descending on the forehead it again becomes fleshy to be lost in the orbicularis palpebrarum and corrugator supercilii; its innermost fibres forming the pyramidalis nasi muscle - prolonged down on the side of the nose -

Action - It raises and throws the skin of the forehead into wrinkles -

It is covered by the skin which is quite loose and is attached to the cranium.

- Nasal Group - Three Muscles-

- Pyramidalis Nasi-

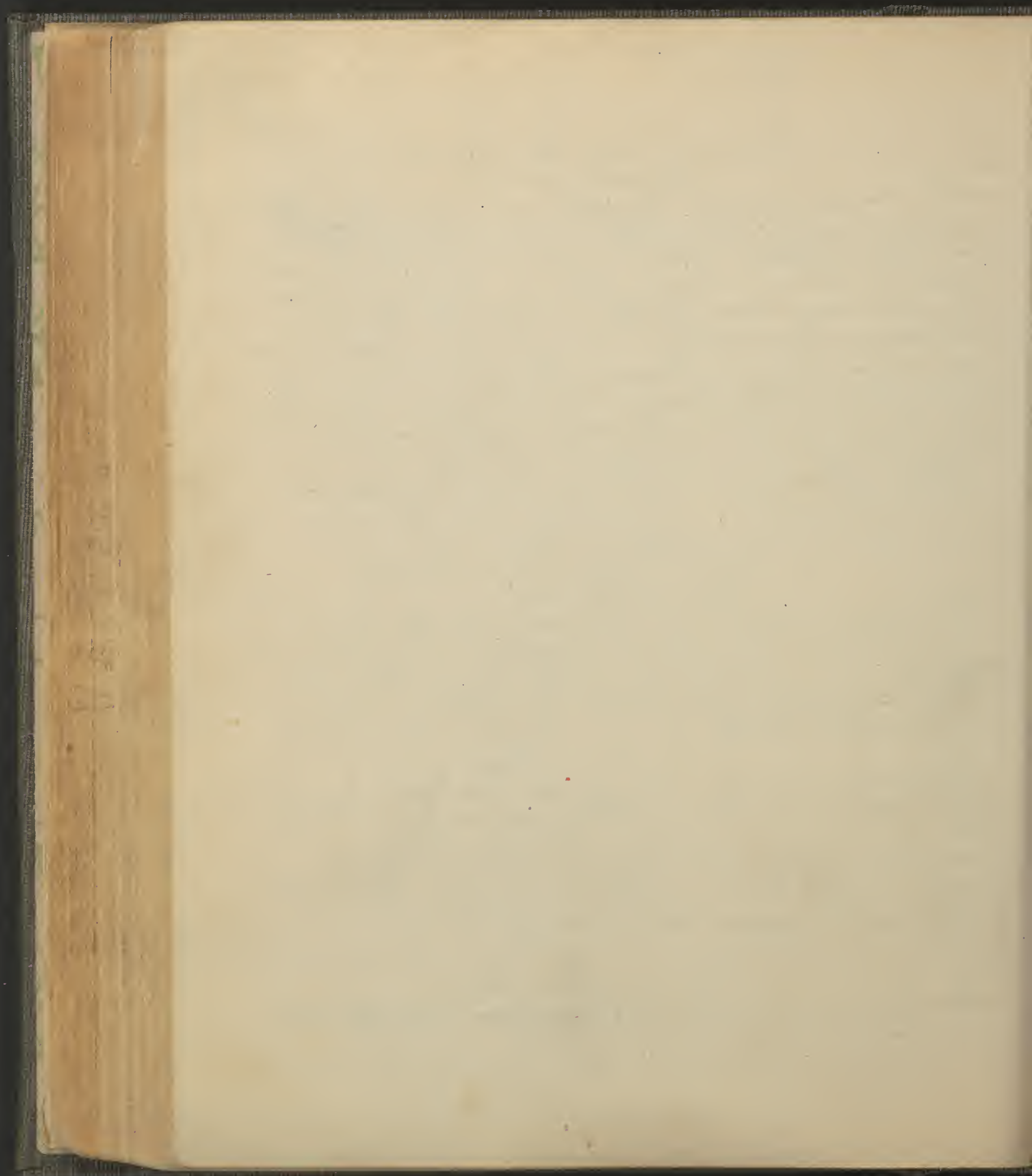
The pyramidalis nasi is formed by the innermost fibres of the occipito-frontalis which descending are lost on the bridge of the nose - (action - It breaks down the inner extremity of the eyebrow and elevates the nose)

- Compressor Naris-

The compressor naris triangular in shape arises from the canine fossa of the superior maxilla by its apex and inserting on the side of the nose meets its fellow of the opposite side in a tendinous raphe on the bridge of the nose - (action - Two are supposed to expand the nostrils)

- Depressor Alae Nasi-

The depressor alae nasi is found just beneath the



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mucone membrane of the upper lip: it arises from the incisive forsa of the superior maxilla and is inserted into the alv of the nose - (Its name indicates its action.)

The muscles of the face are nearly all small and pale and fatty; as a rule they arise from bone and are inserted into soft parts; their actions produce the varying expressions of which the countenance is capable.

- The Muscles of Mastication - Five -

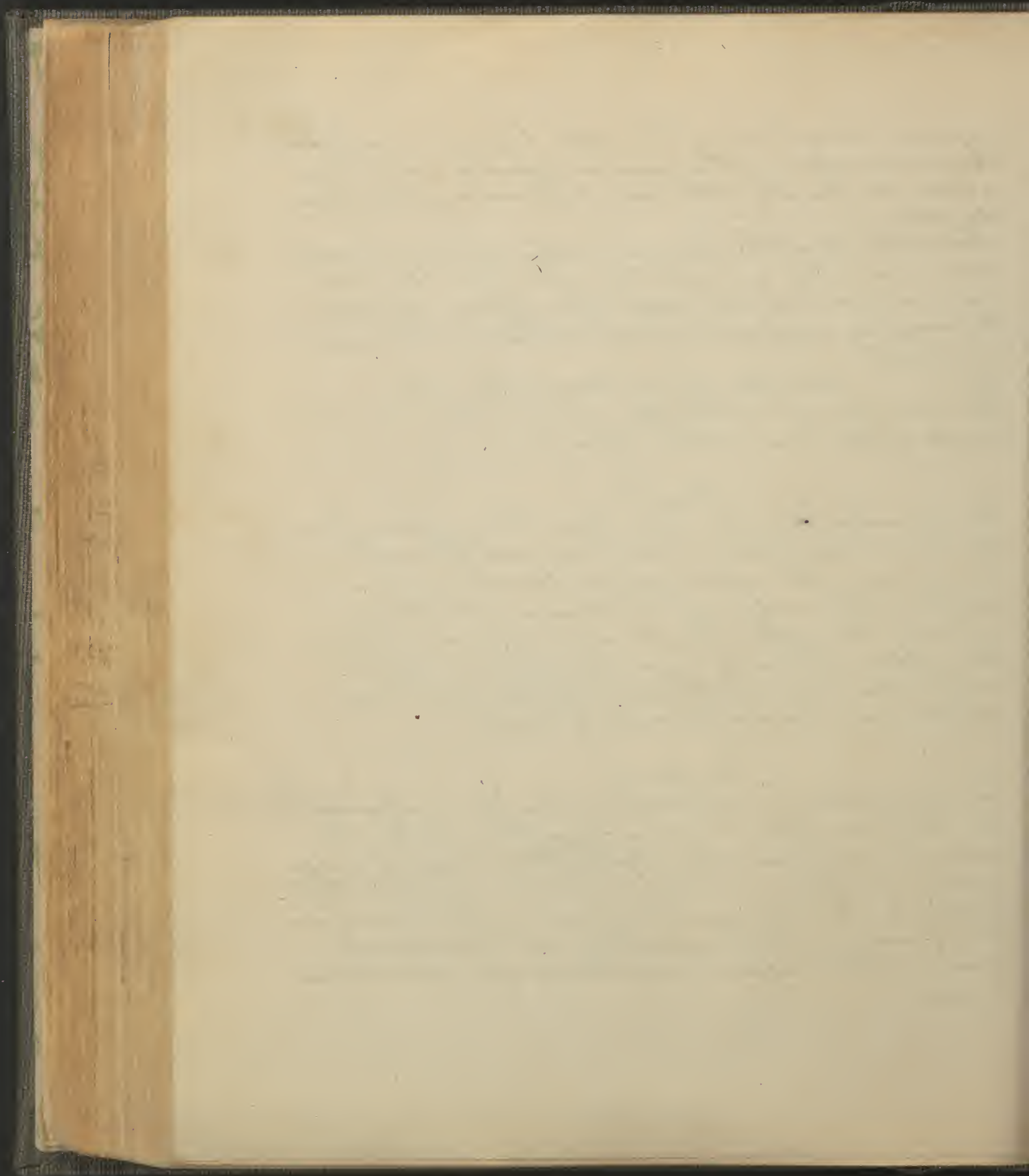
The muscles of mastication produce various movements of the lower on the upper jaw.

- Masseter -

The masseter muscle arises from the zygoma, from the lower border of the malar bone and from the malar process of the superior maxilla and is inserted into the outer surface of the ramus of the lower jaw as far as its angle. The muscle is square-shaped, its anterior fibres, of origin, passing downward and backward superficial to the posterior fibres which pass downward and forward.

- Temporal -

The temporal is a radiated muscle occupying the temporal forsa; it arises from the whole of the temporal forsa from the whole of the ^{length} temporal ridge and from a fascia which covers the muscle called temporal; it converges downward with an inclination forward, and is inserted into the coronoid process of the inferior maxilla, its apex and inner aspect.



- Buccinator -

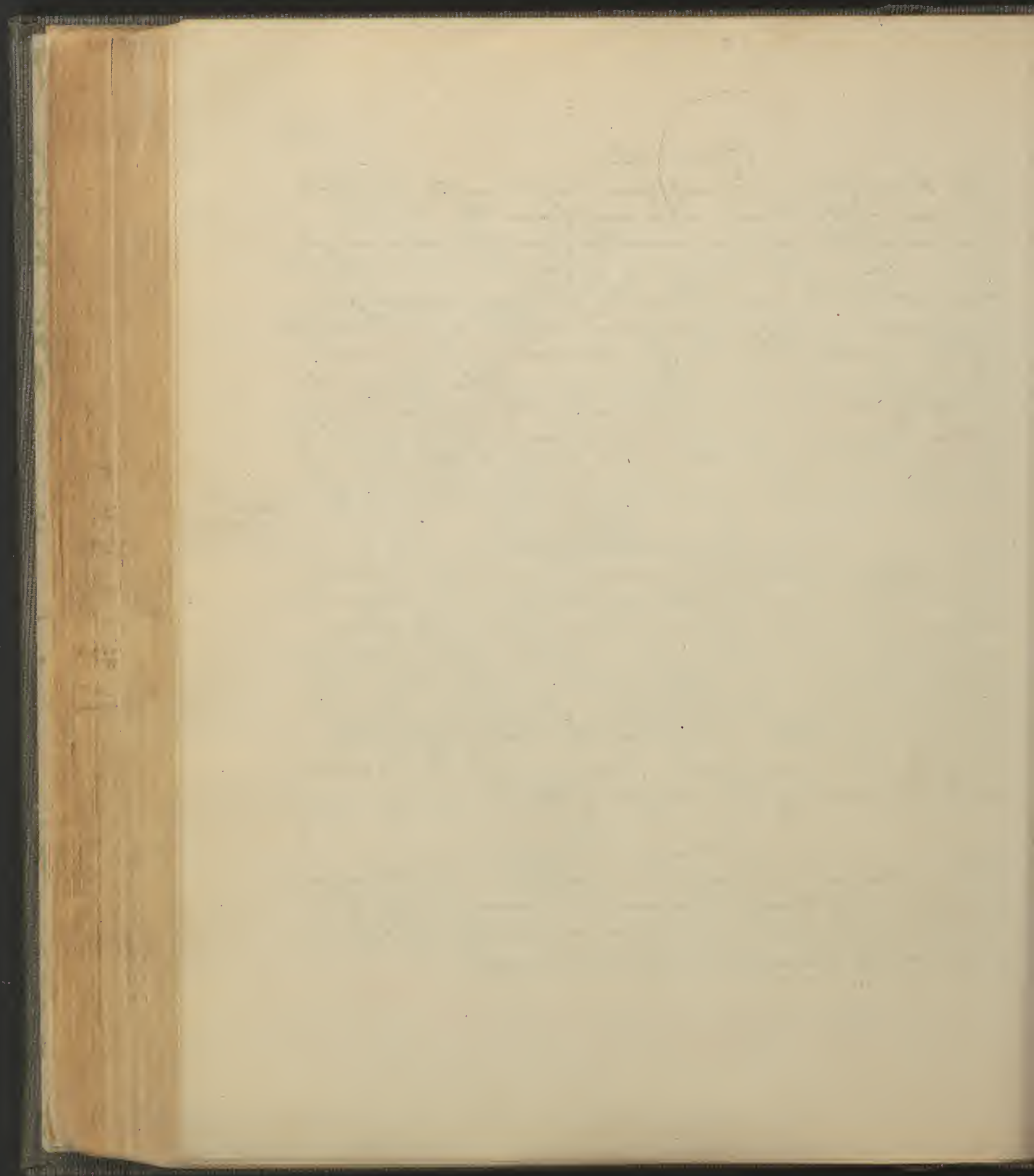
The buccinator, or trumpet muscle, is the bulkiest element of the cheek. It arises from the alveolar process of the superior maxilla from the external oblique ridge of the lower jaw as far forward as the 2^d bicuspid tooth and from the pterygo-maxillary ligament and converging is inserted into the angle of the mouth. The pterygo-maxillary ligament extends from the hamular process of the pterygoid plate to the posterior extremity of the molar ridge of the lower jaw; giving origin in front to some of the fibres of the buccinator and behind to the fibres of another muscle (superior constrictor of the pharynx)

- External Pterygoid -

The external pterygoid muscle arises by a forked origin there passing through the fork an important artery (the internal maxillary) from the pterygoid ridge from the under surface of the outer face of the greater wing of the sphenoid bone from the external pterygoid plate from the tuberosity of the superior maxilla and from the tuberosity of the palatine bone and passes backward to be inserted into the neck of the condyle of the lower jaw. - *fib. cart.*

- Internal Pterygoid -

The internal pterygoid arises from the pterygoid fossa and passing downward backward and outward is inserted into the inner surface of the ramus of the lower jaw as far as its angle.



Nov 7

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The Muscles of the Back.

Three muscles of the back which are described here lie in three superimposed layers.

First Layer, Two Muscles.

Trapezius.

The trapezius arises from the superior curved line of the occipital bone from the posterior occipital protuberance and from the spinous processes of all the cervical and dorsal vertebrae; the fibres converge outward, some ascending obliquely, some descending obliquely and some running transversely, to be inserted into the outer third of the clavicle ^{(u) Ext +} acromion process and whole length of the spine of the scapula, i.e. the origin of the Deltoid muscle. ^{A space in spine 8 or 9}

Extending from the posterior occipital protuberance down to the seventh cervical vertebra is a fibrous cord which is attached to the extremities of the spinous processes intervening between those points, known as the ligamentum nuchae, and in fact the trapezius muscle arises from this and not directly from the spinous processes which it covers; though the statement made in the description is indirectly true and more easily remembered.

Action - According to the direction of the fibres which act it draws the scapula backward or downward and backward and backward or upward and backward.

Latisimus Dorsi.

The latisimus dorsi arises from the spinous processes of the lower dorsal vertebrae (4-6), of all the lumbar vertebrae from the spinous tubercles of

if it slips down you have dislocation of the
Scapula - causing winged Scapula

by means of fascia from both fascia.

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the sacrum from the posterior part of the crest of the ilium (A) and by fleshy slips from the three or four lower ribs. At its origin except that from the ribs the muscle is tendinous passing upward and outward converging it becomes fleshy and thicker and passing over the lower angle of the scapula and winding around the teres major is inserted along with it into the posterior bicipital ridge of the humerus - in front of the axilla. Action - It carries the humerus downward and backward, rotates inward, is an inspiratory agent and when the humerus is fixed as in climbing or by crutches, it moves the body forward - as in climbing.

Second Layer - Two Muscles -

Levator Anguli Scapulae -

The levator anguli scapulae arises by tendinous slips from the posterior tubercles of the transverse processes of the four upper cervical vertebrae, these uniting from the belly of the muscle which descends obliquely outward to be inserted into the posterior border of the scapula from its superior angle to the intersection of the spine and posterior border - Its name indicates its action.

Rhomboides -

The rhomboides arises from the spinous processes of the last cervical and four upper dorsal vertebrae and passing downward and outward is inserted into the anterior border of the scapula from the spine to the inferior angle - Some make two muscles of this calling that portion which arises from the spinous process of the last cervical vertebra Rhomboides minor and the remainder Rhomboides major.

muscle from the insertion into the upper ribs except 1st

Muscles From Cervical & Spinal Fascia
inserting, fascia of Cervical Fascia
N.B.S. W. 5

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(Action - It moves the scapula upward and backward)

Nov. 14 '91

- Third Layer - Three Muscles -
- Serratus Posticus Superior -

The serratus posticus superior arises tendinous from the spinous processes of the two lower cervical and two upper dorsal vertebrae and passing downward and outward is inserted by fleshy serrations into the upper borders of the 2^d 3^d 4th & 5th ribs just beyond their angles -

Action - It is an inspiratory agent -

Nov. 14 '91

- Serratus Posticus Inferior -

The serratus posticus inferior arises tendinous from the spinous processes of the two last dorsal and two upper lumbar vertebrae and passing upward and outward is inserted by fleshy slips into the lower borders of the four inferior ribs -

Action - It is an expiratory agent -

Nov. 14 '91

- Splenius -

The splenius muscle arises from the spinous processes of the four lower cervical and four or six upper dorsal vertebrae and ascending divides into two parts, one known as the splenius capitis is inserted into the surface of the occipital bone between its curved lines and into the mastoid portion and process of the temporal bone; the other known as the splenius colli is inserted into the transverse process of the three upper cervical vertebrae (their posterior tubercles) -

Action - Bends the head and upper part of the

Erecta Spinal - is attach. to sacral groove
 Spinous process of all lum. vertebrae
 Trans " " " " " and the
 post 1/4 of an lip of crest of ilium

Divides off 12th rib into ext & int process

Ext. = Saco lum. attached to out surface
 of 1-6 ribs at this & cross the oblique line on rib

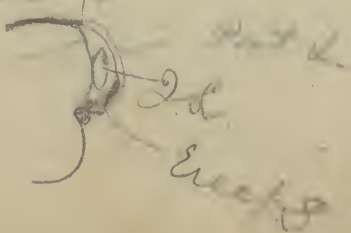
Forig is. Desi. almost all spinous pro.
 attach to all dorsal ribs. Spinous
 process - also the rib 8-10 of lower
 ribs is ext. or ant to tub. of the rib

The post ^{small} 12th of trans. process over the
 back of the Erecta spinal

The middle ^{small} trans. process
 passes in front of the erecta spinal

The arrangement of mus & fascias is as
 follows.

- 1st Ant. small of post ~~thorax~~ of trans
- 2nd Quad lumbum.
- 3rd Middle " " " " "
- 4th Erect. Spine
- 5th Pectorum " " " "



shine back and rotates the head towards its side.)

- The muscles of the Thorax - Dec 17th

- Triangularis Sterni -

The triangularis sterni is found on the anterior aspect of the front wall of the thorax on either side of the sternum. It arises from the edge of the sternum and from several costal cartilages (3^d to 6th or 7th) and passing upward and outward is inserted into the 2^d, 3^d, 4th, 5th costal cartilages and corresponding ribs. (Having a corresponding insertion to its antagonist the serratus posticus superior.) Action - It is an expiratory agent. Dec - 17th

- The Inter-costal Muscles -

The interval between two adjacent ribs is occupied by two layers of muscular fibres which extend between adjacent edges of the ribs ^{from the ext.} and are known as external and internal inter-costal. The external intercostal muscles (eleven in number) have a direction downward and forward like the external oblique muscle of the abdomen and extend from the tubercles of the ribs to the costal cartilages. The internal inter-costal muscles (eleven on each side) have a direction downward and backward and extend from the sternum to the angles of the ribs; corresponding in direction of their fibres to the internal oblique muscle of the abdomen.

Action - They raise the ribs when action from above, being then inspiratory agents and depress the ribs when acting from below, being then expiratory agents.)

muscle from fascia from mid. line of sternum to 1st. costal

Deep cervical fascia ^{superficial}

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Muscles of the Neck-

(Superficial Group - Two Muscles -

Platysma Myoides -

EXAM. 20-91. 186.

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1889

When the integument and a thin layer of superficial fascia has been removed from the side and front of the neck there is seen a thin pale broad muscle called the platysma myoides. It arises from the fascia covering the pectoralis major and deltoid muscles and passes upward and inward over the clavicle to cover in the side and front of the neck. ^{not attached}

Its innermost fibres are interlocked with the opposite muscle along the upper part of the middle line of the neck the others are inserted into the inferior maxilla, some passing over it to be lost on the side of the face and some continuing to the angle of the mouth. These last are joined by some accessory fibres which take their origin on the side of the face (from the fascia, covering the masseter muscle and these are known as the laughing muscle, Risorius Santorini).

Action - It depresses the lower jaw; it can draw the angle of the mouth downward as as to produce a melancholy expression or carry it backward as in laughing.

Sterno-cleido-Mastoid-

The sterno-cleido-mastoid is the second of the superficial muscles of the neck and lies beneath the platysma between ^{superficial} layers of cervical fascia. It is one of the most important muscles in the body and derives its name from its origin and part of its insertion. It arises by a forked origin, tending from about the inner 3^d of the clavicle, this

infra hypi's group.

The appropriate above.

last origin is variable as it may be greater or less than stated. the muscle ascends obliquely upward and backward on the side of the neck, there being a fissure between its points of origin which extends some distance before the two parts of the muscle unite. It is inserted into the mastoid process of the temporal bone and adjacent portion of the superior curved line of the occipital bone.

Action - When both muscles act they bow the head forward; when one muscle acts it draws the head to that side (turning the face somewhat to the opposite side.) - Houghton

- Depressors of the Hyoid Bone - Four Muscles -
- Sternohyoid -

The sternohyoid muscle derives its name from its attachments - It is ribbon-like in shape and vertical in direction; arising from the posterior aspect of the upper part of the sternum and perhaps from the inner extremity of the clavicle ~~on the ligament~~ - 91 ~~between the clavicle and sternum~~, it ascends the front of the neck beside the middle line to be inserted into the hyoid bone - body -

- Sternothyroid - The two muscles of the neck

Lying behind the sternohyoid and slightly broader than it is another ribbon-like vertical muscle called the sternothyroid from its attachments; it arises from the posterior surface of the upper end of the sternum and perhaps also from the cartilage of the 1st rib - It ascends beside the middle line of the neck and is inserted into the oblique ridge on the ala of the thyroid cartilage.

to central basin has beneath the S. C. M. r.

! 100-2 in above the storage.

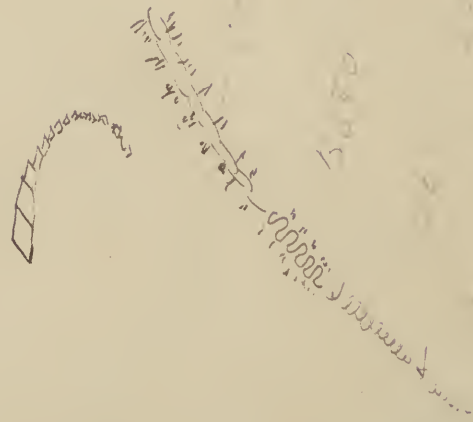
It is often traversed below by a tendinous inter-
section, as is also the sterno-hyoid.)

- Thyro-hyoid -

The thyro-hyoid is a short ribbon-like muscle
which continues the course of the sterno-thyroid
to the hyoid bone; its ^{name} being indicative of its attach-
ments; it arises from the oblique ridge on the ala
of the thyroid cartilage and is inserted into the hy-
oid bone - Frequently some of the fibres of the sterno-
thyroid are continued directly into this muscle -

- Omo-hyoid - ^{omohyoid}

The omo-hyoid derives its name from its attach-
ments; omo meaning scapula; it is a double bellied
muscle passing with a curve across the side of the
neck - Arising ^{from} the upper border of the scapula
near the supra-scapular notch and perhaps from
the ligament stretched across the notch, it passes
fleshy forward and upwards until beneath the ster-
no-clavicular mastoid when its posterior belly ceases by
becoming the central tendon of the muscle, it then
becomes again fleshy, its anterior belly, and passes
more nearly upward to be inserted into the hyoid
bone, at the junction of its body and cornua - The
central tendon is held down, so as to give the mus-
cle its curve, by a loop of fascia which passes to the ^{inner} ^{end} of the sternum.
The depressors of the hyoid bone as their names
indicates, draw the hyoid bone down; the sterno-thy-
roid draws down the larynx and the two omo-hyoids
acting draw the hyoid bone downward and backward



comes from the middle of the outer
Side. (not the tip.)

(These muscles are sometimes called the infra-hyoid group).

- Elevators of the Hyoid Bone - Five Muscles -

- Digastric -

The digastric as its name imports is a double bellied muscle being round in shape, curved in direction and found at the upper part of the side of the neck. It arises fleshy from the digastric fossa of the temporal bone and passing downward and forward, becomes tendinous, this portion between its origin and the central tendon is called its posterior belly, as soon as it becomes tendinous it pierces obliquely the belly of a small muscle which lies beside it called the stylo-hyoid, after emerging the tendon plays through a loop of fascia which binds it to the hyoid bone then becoming again fleshy to form into anterior belly, it changes its direction passing upward and forward to be inserted into the digastric fossa of the inferior maxilla.

- Stylo-hyoid -

The stylo-hyoid is a small muscle found lying beside the posterior belly of the digastric and deriving its name from its attachments. It arises from the styloid process of the temporal bone and passing downward and forward is inserted into the hyoid bone; just before its insertion it is pierced by the central tendon of the digastric.

- Mylo-hyoid -

The mylo-hyoid is a broad thin triangular muscle forming the floor of the mouth; it arises from the whole length of the mylo-hyoid ridge and passing

downward and inward the greater portion the muscle meets its fellow of the opposite side on the middle line forming a raphe, some of its posterior fibres are inserted into the hyoid bone -

Genio-hyoid-

The genio-hyoid is a small muscle increasing in size slightly as it descends and lying beneath the mylo-hyoid just beside the middle line. It arises from the inferior spina mentalis and descends to be inserted into the hyoid bone.

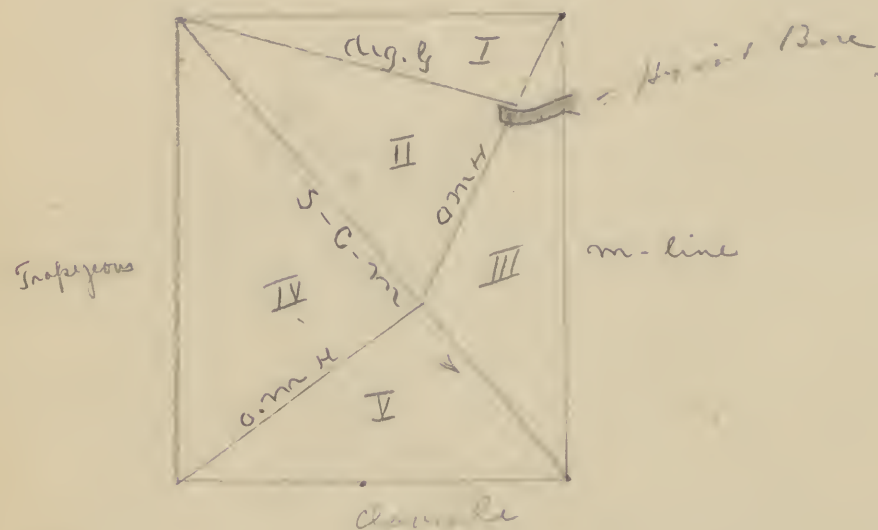
- Genio-hyo-glossus-

The genio-hyo-glossus is a thin radiating fan-shaped muscle; arising by a narrow tendinous origin from the superior spina mentalis it immediately radiates fleshy to be inserted into the under surface of the tongue from base to near its apex, some of its lower fibres are inserted into the hyoid bone. This muscle lies close to the middle line and beside its fellow of the opposite side.

- Surgical Triangles of the Neck-

The surface presented by the side of the neck is quadrilateral in outline, the clavicle being below, the body of the inferior maxilla and a horizontal line passing backward from it being above, the middle line in front and the anterior edge of the trapezius muscle behind.

This space is subdivided into two great triangles, one anterior and the other posterior by the sterno-cleido-mastoid. The great anterior triangle is bounded, in



- I Digastric or Sub. max Δ
 - II Superior carotid Δ
 - III Inferior " "
 - IV Sub occipital "
 - V Sub clavian " may not
- occur when you have a redundant J.C.P.



1. The whole neck is divided into
the middle and the upper.

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front by the middle line; behind by the sterno-cleido-
mastoid; its base is above and formed by the body of
the inferior maxilla and a line passing to the mas-
toid process.

The great posterior triangle has its base below at the
clavicle; in front it is bounded by the sterno-cleido-
mastoid and behind by the anterior edge of the tra-
pezius muscle.

Each of these great triangles is subdivided into
smaller. The anterior is subdivided into three:

1st The inferior carotid triangle, which has for its three
sides the middle line of the neck, the sterno-cleido-
mastoid and the anterior belly of the omohyoid.

2^d The superior carotid triangle has for its three bound-
aries; the sterno-cleido-mastoid the posterior belly
of the digastric and the anterior belly of the omohyoid.

3^d The Digastric or submaxillary triangle has
its base at the body of the inferior maxilla its sides
are formed by the anterior and posterior bellies of the
digastric.

The great posterior triangle is subdivided into two.
1st The Suboccipital has its base below formed by the
posterior belly of the omohyoid, its sides are formed
by the sterno-cleido-mastoid in front and the tra-
pezius behind.

2^d Subclavian triangle is smaller but vastly more
important than the suboccipital, its base is the clav-
icle, above it is the posterior belly of the omohyoid,
in front is the sterno-cleido-mastoid. This contains
the subclavian artery and vein (hence its name)
and brachial plexus of nerves. Observe that the sub-
divisions are made, in the great posterior triangle by

Content of S. A is given for S. clonans

The Scapula

Produced by the inf. divergence of the
scapular mus.

Boundaries - in front & inner side by S. ant.

Behind & outer side by S. mus.

Its apex abt. middle of side of Cerv.
Tubula 3rd c. v. 92

Base is given for sub. clav. art.

Contents, Branch. ^{above} ^{in front} ^{Sub clav. art.}

Insertion of S. A.

S. tubule on the upper sin. foss and the
ridge running forward from it.

the posterior belly of the omohyoid; in the great anterior triangle of the anterior belly of the omohyoid and by the tub. bellum of the Digastric-

-The Scaleni Muscles

The two scaleni muscles form part of a group called the paravertebral, the rest of the group being unimportant; the only fact connected with them worthy of note being that they are interposed between the common carotid artery and the transverse processes of the cervical vertebrae-

The two scaleni muscles are the scalenus posterior and anterior; a small portion of the posterior is by some individualized into a separated third scalenus and called medius. These muscles are of great importance owing to the fact that occupying a position in the lower part of the side of the neck they come into important relation with the subclavian artery and brachial plexus of nerves-

-Sclenus Anticus-

The sclenus anticus triangular in shape arises from the anterior tubercles of the transverse processes of the 3^d 4th 5th & 6th cervical vertebrae by tendinous slips these uniting as they descend to form the muscle it is inserted into the upper surface of the first rib by a narrow tendon. tubercle on upper ridge union found from ch. - 92

-Sclenus Posticus-

The sclenus posticus arises from the posterior tubercles of the transverse processes of all the cervical vertebrae except the first; descending and dividing into

-and in front of sub. cl. artery.



W. action of these mus.

then lies between the inner face of
the rib of the cord and the
upper part of the thoracic
or lower vocal cord. is a
muscle called the thoracic
accessory muscle.

Rectus Capitis anticus major.

origin 4 slips from ant. lat. of trans. process
of 3rd 4th 5th & 6th C. vertebra. and ascending
is inserted into the basilar process.

Rectus Capitis anticus minor is behind
origin - from ant. surf. lateral mass of
atlas & root of transverse process and
passing ^{upward} & inward is
inserted into basilar process immedi-
ately behind preceding.

Rectus Lateralis origin from upper
surface of trans. process of atlas & is
inserted into jugular process of
its under surface of occip bone.

Longus Colli

Superior portion arises from ant. lat.
of trans. processes of 2nd 4th & 5th cer. &
ascending ^{obliquely} inward - is inserted by
a narrow tendon into the tubercle
on ant. arch of atlas.

Inferior Oblique portion arises from
the front of the bodies of the 1st two
or 3 dorsal vertebra and ascending
obliquely outward is inserted into
the ant. tubercle of the transverse proc.
of the 6th & 7th cervical vertebra.

Longus Cervicis has 3 parts of spine
ascending from cervical to articular
processes

two portions, one is inserted into the first rib between its tubercle and angle and is the part sometimes called *scalenus medius*, while the other descends to the same point on the second rib. (behind the groove for subcl. v. artery.)
 (Action - When acting on the ribs the *scaleni* are inspiratory agents; when acting on the vertebral column they flex it.) See Gray for their nerves. (92)

- Muscles of the Larynx -

The movements of the separate cartilages which constitute the larynx on each other are effected by five small muscles chiefly, called the *intrinsic muscles of the larynx*.

- Crico-thyroid -

The crico-thyroid, a triangular muscle, arises from the front of the cricoid cartilage and passing upward, backward and outward is inserted into the lower border of the thyroid cartilage from the middle line in front to the inferior corner.
 (Action - It stretches the vocal cords by letting the thyroid cartilage forward and downward on the cricoid.)

- Posterior Crico-arytenoid -

The posterior crico-arytenoid arises from the depression on the posterior aspect of the cricoid cartilage and passing upward outward and forward is inserted into the outer angle of the base of the arytenoid cartilage.
 (Action - It separates the vocal cord from its fellow by rotating the anterior angle of the base of the arytenoid cartilage outward; the vocal cord being attached to this angle.)

ref. to page 192

- Lateral Crico-arytenoid-

The lateral crico-arytenoid arises from the side of the cricoid cartilage and passing upward outward and backward is inserted into the outer angle of the base of the arytenoid cartilage-

(Action- It is the antagonist of the posterior crico-arytenoid, for rotating the anterior angle of the base of the arytenoid cartilage inward, it thus approximates the vocal cord to its fellow-)

- Arytenoid-

The arytenoid is a single muscle arising from the concave posterior surface of one arytenoid cartilage it passes transversely across the interval between the two arytenoid cartilages and is inserted into the same part of the opposite cartilage- (Action- By drawing the arytenoid cartilages together it closes the glottis-)

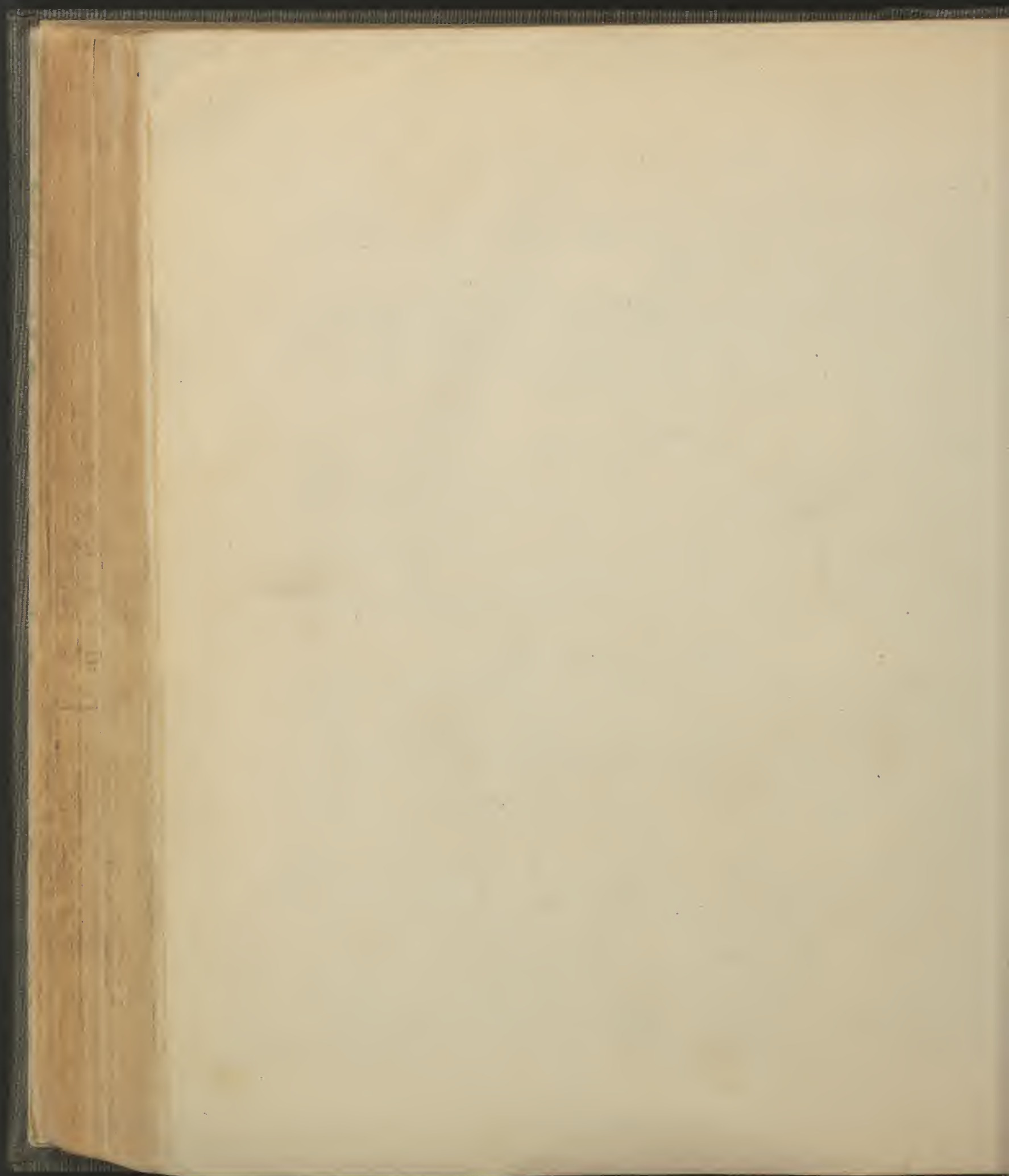
- Thyro-arytenoid-

The thyro-arytenoid arises from the receding angle of the thyroid cartilage just beside and external to the attachment of the vocal cord and passing backward parallel with the vocal cord is inserted into the anterior angle of the base of the arytenoid cartilage- (Action- By approximating its two points of attachment it relaxes the vocal cord and is said to throw the cord into vocalizing position i. e. the cord is thrown with its edge transverse to the length of the air-tube-)

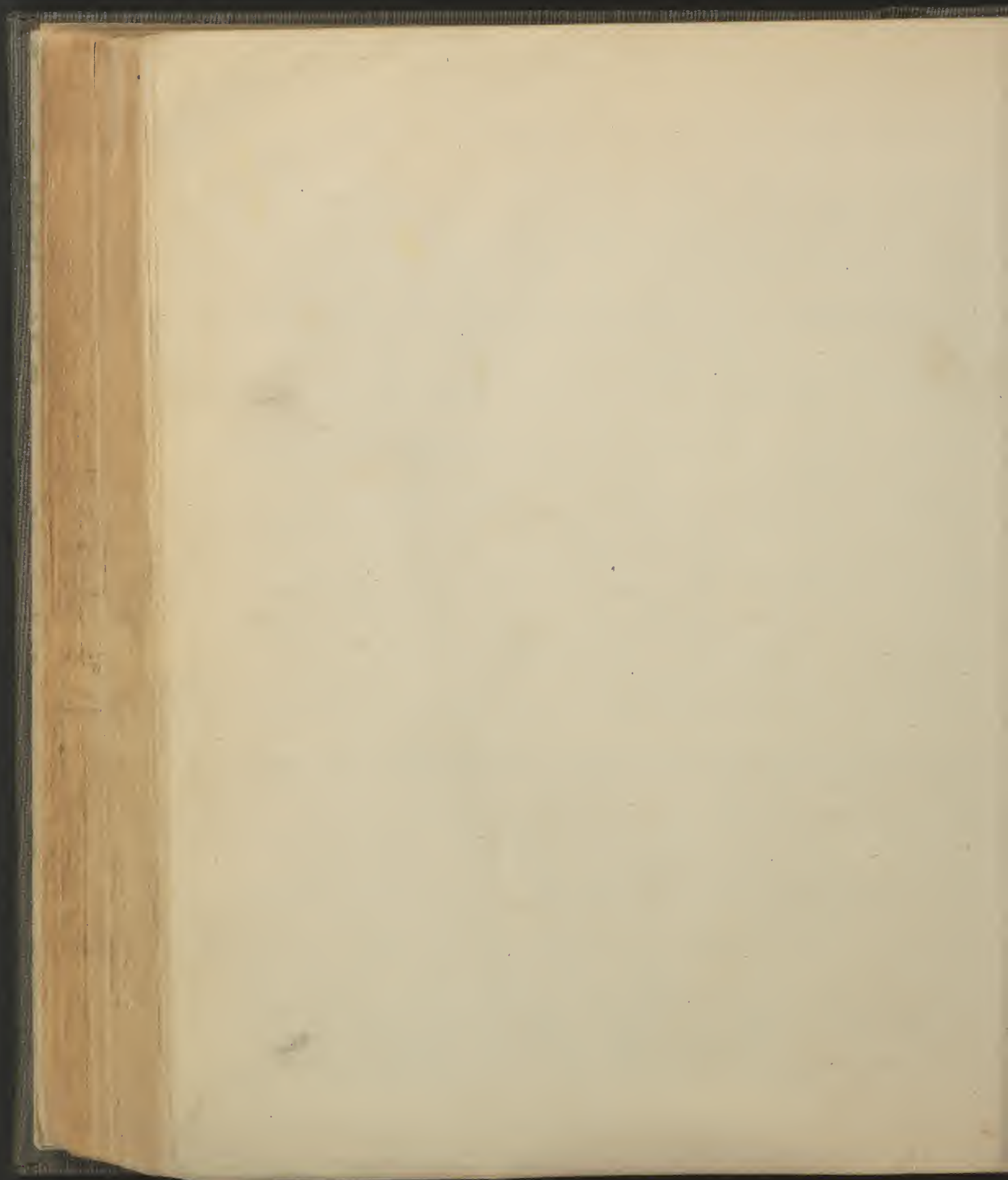
- The Abdominal Muscles-

The anterior abdominal wall is formed chiefly by six flat thin muscles, three on each side, called

Twelve months 170



the broad muscles of the abdomen. Besides these there are two other pairs, the pyramidales which are small and insignificant and the recti which are long but narrow. When carefully dissected it is found to consist of the following structures from without inward - 1st the integument - 2^d two layers of superficial fascia with fatty tissue interposed - 3^d The external of the three broad muscles, the external oblique - 4th The intermediate broad muscle, the internal oblique - 5th The innermost of the three broad muscles, the transversalis - 6th lining the inner face of the transversalis muscle is a thin fibrous membrane called the transversalis fascia, and 7th the parietal layer of the peritoneum - The Rectus and Pyramidales have been ignored since their position needs explanation before it is given. When the integument and superficial fascia have been removed the external oblique muscle is brought into view, which on the front of the abdomen is seen to be tendinous and that its fibres reach the middle line where there being no bony surface which they can seize they are attached by interlacing with the tendinous fibres of the opposite muscle and along this same line the internal oblique and transversalis of one side are inserted, the former into the internal oblique and the latter into the transversalis of the other side; so that this middle line extending from the sternum above to the symphysis pubis below is the point of confluence of six muscles, three from each side meeting and interlacing here; this is known as the linea alba, about its centre is seen the umbilicus or navel and the whole line extending from



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the uniform cartilage to the symphysis pubis is slightly sunken below the adjoining surface on either side. This is produced by the bulging of the Pectus muscle of each side, which ascends beside the linea alba lying between the tendons of the broad muscles which strike form a sheath for it; so that the width of the linea alba may be said to be the distance between the inner edges of the Pecti muscles.

Nov. 12-91
— External Oblique —

The External oblique muscle of the abdomen derives its name from the downward and inward obliquity of its fibres, and from its position, being external to another oblique muscle. It arises by 8 tooth-like processes, digitations, fleshy and interlocking with similar digitations of two muscles the serratus Magnus, for its upper 5 digitations (and the latissimus Dorsi for its 3 lower) from the external or anterior surface of the eight lower ribs, from their origin the fibres pass downward and inward the digitations gradually blending together to form the belly of the muscle which towards the front of the abdomen terminates in a tendon and as this tendon is flat and spread out like a membrane it is called an aponeurosis which is inserted into the linea alba from sternum to symphysis pubis. The posterior fibres descend almost vertically to be inserted into the crest of the ilium its anterior $\frac{2}{3}$ or $\frac{1}{2}$; the intermediate fibres becoming aponeurotic are inserted into the anterior superior spinous process of the ilium and into the pubis its spine and pectineal line. That portion of the aponeurosis which extends from the anterior superior

out
2/3

Peet line 1 in ext. to spine of pubes 197

spinous process of the ilium to the spine of the pubes is the lower border of the aponeurosis is free between its points of attachment is folded slightly inward on itself and is called Poupart's ligament; now for the distance of about an inch before Poupart's ligament reaches the spine of the pubes it sends downward some fibres to be inserted into the pectineal line for that distance, these form what is called Gimbernat's ligament (which is triangular in shape, its apex within and its base about 1 inch within). At the lower inner part of the aponeurosis near the symphysis pubis is seen an opening in it called the external abdominal ring which is formed by a separation of fibres of the aponeurosis, it is triangular in shape and oblique in direction, its apex being upward and outward, and base downward and inward at the crest of the pubes; the edges of the aponeurosis which form the sides of the ring are called its pillars, external and internal, the external pillar being inserted into the spine of the pubes (and the internal interlacing with the internal pillar of the opposite muscle on the front of the pubes) The apex of the ring for a short distance down is obscured by some curved fibres called the intercolumnar fibres - The external abdominal ring transmits in the spermatic cord in the female the round ligament - Intercolumnar fascia -

Summary - Origin - By 8 digitations from the external surface of the 8 inferior ribs - Direction, into the linea alba its whole length, the spine of the pubes, the pectineal line of the pubes, the anterior superior spinous process of the ilium and the anterior 1/2 of the crest of the ilium -

action of these fibres.
(uterus dis.)



The original work is in the library of the University of Michigan -

copy. Underneath the
rest of the work is

Nov 13. 91
- Internal Oblique -

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The internal oblique muscle of the abdomen derives its name from the upward and inward obliquity of its fibres and from its position, being just internal to the external oblique. It arises by a thin tendinous membrane called the fascia lumborum from the spinous processes of the lumbar vertebrae, from the anterior $\frac{2}{3}$ of the crest of the ilium and from the outer $\frac{1}{2}$ of Poupart's ligament.

The fascia lumborum terminates in fleshy fibres on the side of the abdomen and those fibres springing from the crest of the ilium are also fleshy; these radiate somewhat, the general direction however being upward and inward and are inserted posteriorly, fleshy into the cartilages of the four lower ribs; on the front of the abdomen it becomes aponeurotic and is inserted into the linea alba its whole length. The fleshy fibres which arise from the outer half of Poupart's ligament are blended with fibres of the transversalis which arise from the same part of the ligament; these blended fibres arch downward and inward and from what is called the conjoined arch as long as they remain fleshy, but as they descend they become tendinous and are called the conjoined tendon which is inserted into the ^{upper part of} pectineal line and crest of the pubes. By reason of the arched arrangement of these fibres they arise for a short distance above the lower border of the aponeurosis of the external oblique. (Poupart's ligament) and consequently leave a small space between their arch above and Poupart's ligament below, between their descending tendon within and their origin without, where the wall of the ab-

A form of *Spicula* *Spicula*
The post Sam. 's *Spicula* is same as *Spicula* *Spicula*.

Post apm = 3 lamella The Post one is
The fascia *Spicula* *Spicula*.

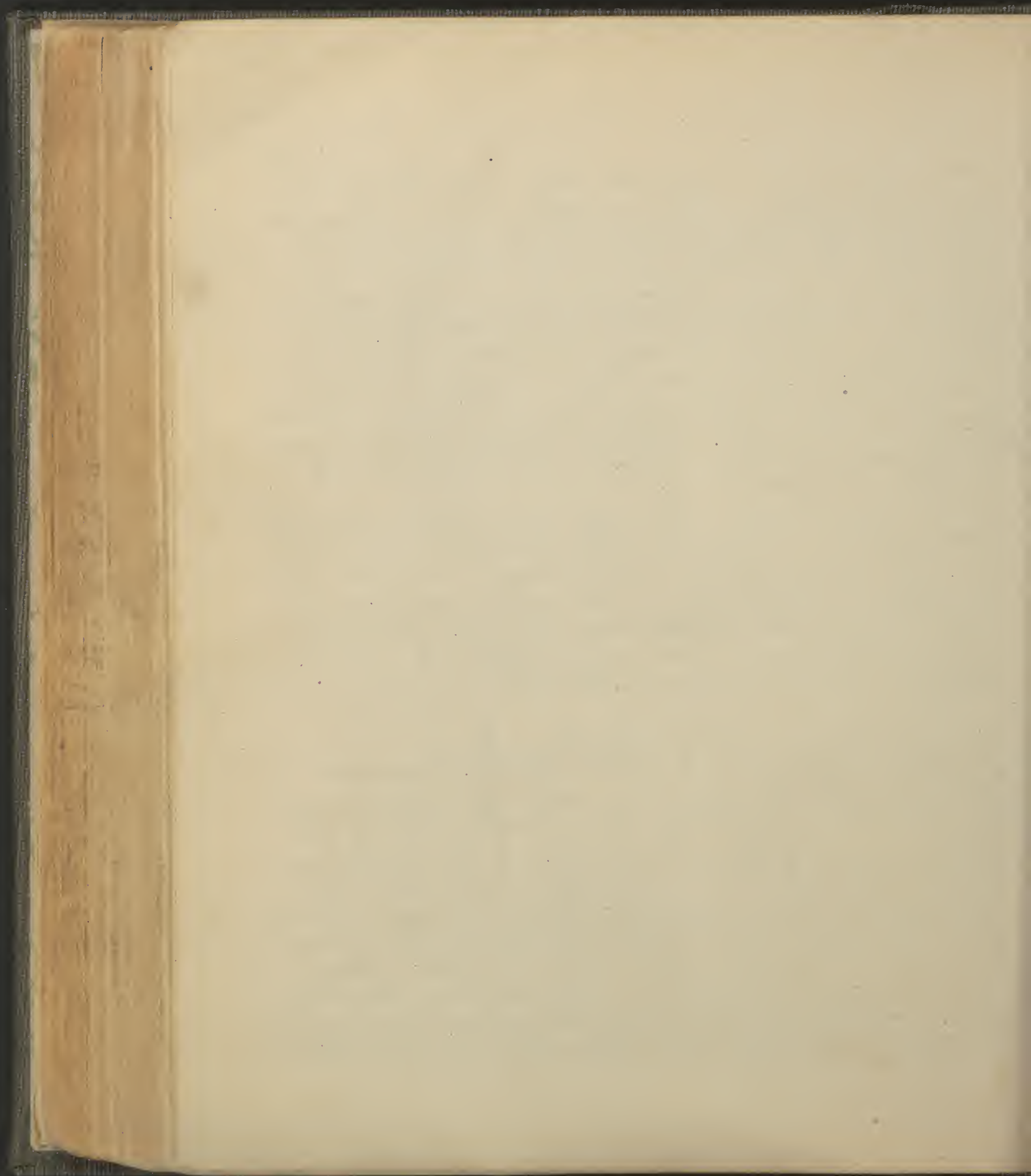
domen has but one muscular element viz the aponeu-
rosis of the external oblique, so that if an incision were
made into the cavity of the abdomen here it would
pass through - 1st the integument - 2^d the two layers
of superficial fascia - 3^d the aponeurosis of the external
oblique - 4th the transversalis fascia and 5th the parie-
tal layer of the peritoneum (it should be borne in
mind that the conjoint tendon descends immedi-
ately behind the external abdominal ring so that at
this point the wall is deficient only in the aponeurosis
of the external oblique through which only does the
aperture penetrate).

Summary - Origin - From the outer half of Poupart's
ligament, the anterior $\frac{2}{3}$ of the crest of the ilium and
from the spinous processes of the lumbar vertebrae - by fascia duct.
Insertion - Into the lower borders of the cartilages of
the four lower ribs into the whole length of the linea
alba and by means of the conjoint tendon into the
pectineal line and crest of the pubes.

My. 391
- Transversalis.

417 G.

The transversalis muscle of the abdomen derives its
name from the horizontal direction of its fibres and
lies just internal to the internal oblique being the
innermost of the three broad muscles of the abdomen.
It arises by means of an aponeurosis from the lum-
bar vertebrae (transverse and spinous processes) fleshy
from the inner aspect of the cartilages of the six in-
ferior ribs, fleshy from the anterior $\frac{2}{3}$ of the crest of
the ilium and fleshy from somewhat less than the
outer $\frac{1}{2}$ of Poupart's ligament. The posterior aponeurosis
becomes fleshy on the side of the abdomen and there



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fibres being reinforced by those arising from the costal
cartilages and from the crest of the ilium pass for-
ward become aponeurotic and are inserted into the
whole length of the linea alba.

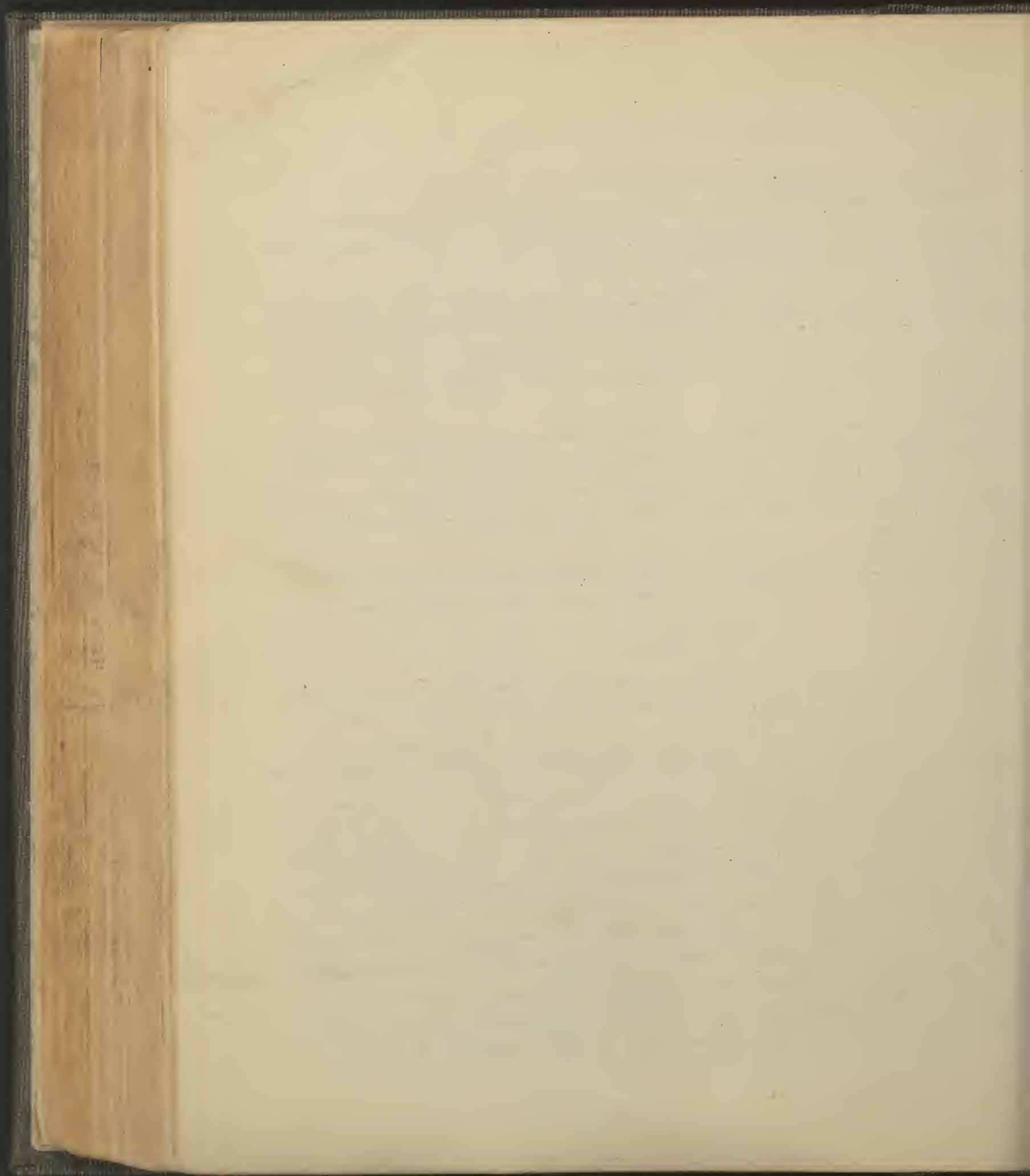
While the fibres which arise from Poupart's ligament
blend with fibres of the internal oblique to form the
conjoined arch and conjoined tendon to be inserted
into the pectineal line and "crest" of the pubes (see
internal oblique.)

Summary - Origin - From the inner surface of the
six lower costal cartilages, from the lumbar verte-
brae, from the anterior $\frac{3}{4}$ of the crest of the ilium and
from a little less than the outer half of Poupart's
ligament.

Insertion - Into the whole length of the linea alba
and into the pectineal line and crest of the pubes.

W 13.91
- Rectus -

The rectus abdominis muscle derives its name from
the perpendicular direction of its fibres; its position
is on the front of the abdomen beside the linea alba
lying surrounded by the aponeuroses of the three broad
muscles; its shape is flat, rib and - like; its origin is
by a flat tendon from the crest of the pubes and from
the front of the symphysis pubis, as it ascends it
becomes fleshy and broader and terminates in three
digitations which are inserted into the cartilages of
the 5th, 6th & 7th ribs beside the sternum. In the upper
half of its course the rectus presents 3 or 4 tendinous
intersections which are called lineal transverse
(before the aponeurosis of the external oblique has
been removed the outer edge of the rectus produces



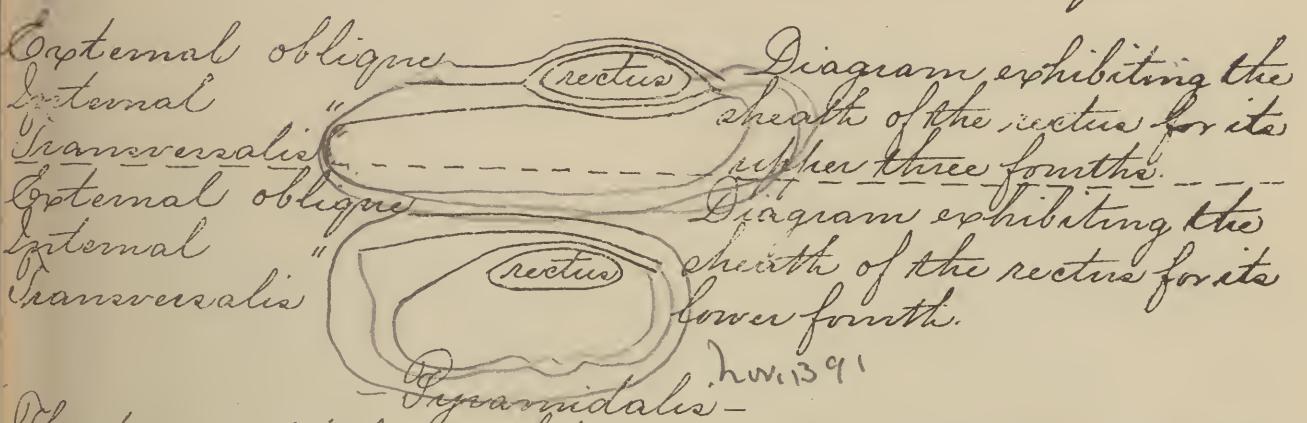
a curved ridge called the *linea semilunaris*). The rectus as it ascends is enclosed between the aponeuroses of the broad muscles and these form what is called the sheath. The sheath of the rectus is complete in front, its whole length but behind it is wanting for its lesser fourth, about. It is thus formed, ^{1st} for the upper $\frac{3}{4}$ of the rectus or in other words from a point about half way between the umbilicus and symphysis pubis upward to its insertion the rectus has in front the aponeurosis of the external oblique and one half of the aponeurosis of the internal oblique, for when the internal oblique reaches the outer edge of the rectus, between the points mentioned, its aponeurosis splits into two layers one passing in front and the other behind the rectus; so that the rectus has behind it for the same extent one half of the aponeurosis of the internal oblique and the aponeurosis of the transversalis and of course between this last and the cavity of the abdomen there will be found the transversalis fascia and the parietal layer of the peritoneum. Now for about its lower fourth, that is from a point about midway from the umbilicus to the symphysis pubis, the rectus has in front of it the aponeuroses of all three broad muscles and behind it has no aponeurosis for the same extent being here separated from the cavity of the abdomen only by the transversalis fascia and parietal layer of the peritoneum where the sheath ends behind it is curved and is called the fold of Douglas.

Summary - Origin - From the crest ^{of the} of the pubes and from the front of the symphysis pubis - } ^{is joined} in origin

Subsp. *triplicatus*
Quadratus *lunulatus*
lunulatus
lunulatus



Insertion - Into the 5th 6th & 7th costal cartilages



Pyramidalis - The pyramidalis abdominis muscle is small and derives its name from its pyramidal shape; it is frequently absent either on one side or both, it is found in front of the lower portion of the rectus muscle and in its sheath. It arises from the front of the crest of the pubes and passes upward and inward, tapering as it ascends to be inserted into the linea alba at a point about half way to the umbilicus.

Actions - The abdominal muscles are agents of expulsion as in voiding the urine and feces in terminating labor. They are also expiratory agents, for when they contract they diminish the capacity of the abdominal cavity, thus squeezing the viscera and forcing them against the rest of the abdominal walls they drive the diaphragm up and at the same time - by their attachment to the ribs they tend to draw down and in this manner diminish the size of the thorax.

The Diaphragm - Practical? Definition and Position - The Diaphragm is the

The Lig. terminalis Polonium is the
same as, sometimes the Drap. gets no sign
from the ant. lamella of the Part.
apart. of the trans. mass.

as per the sketch
where the ant. lamella of the part. is
of the Drap. just below the origin of
the drapt. from its

area. These tubes enter the Drap. for about the 1st
of the section.

arched muscular septum between the two cavities of the trunk, presenting its upper convex surface as the floor of the thoracic cavity and its equally concave under surface as the roof of the abdomen.

2^d Relations - It supports by its upper surface the pleura on each side, containing the lung and the pericardium in the centre containing the heart; below it is covered by peritoneum and is in relation with many abdominal viscera - (liver, spleen, stomach and pancreas) and kidneys.)

3^d Origin - It arises in front from the posterior surface of the sternum, on each side from the inner surface of the six lower ribs, on each side by a ligamentum arcuatum externum, on each side by a ligamentum arcuatum internum and from the front of the vertebral column by two crura right and left. 4th Its various points of origin studied individually -

(a) Between that part which arises from the posterior surface of the sternum and that part on each side which arises from the adjacent rib there usually exists a fissure for a short distance the muscular structure here being wanting, and the aperture which would otherwise exist between the thorax and abdomen is closed by other structures -

(b) The origin from the inner surface of the ribs is by digitations which "interlock" with similar ones of the transversalis abdominis muscle.

(c) The Ligamentum arcuatum externum arches across the quadratus lumborum muscle from the apex of the 12th rib to the apex of the transverse process of the 1st or 2^d lumbar vertebra; - usually, the 2^d

7173. Situation of oropharyngeal opening?

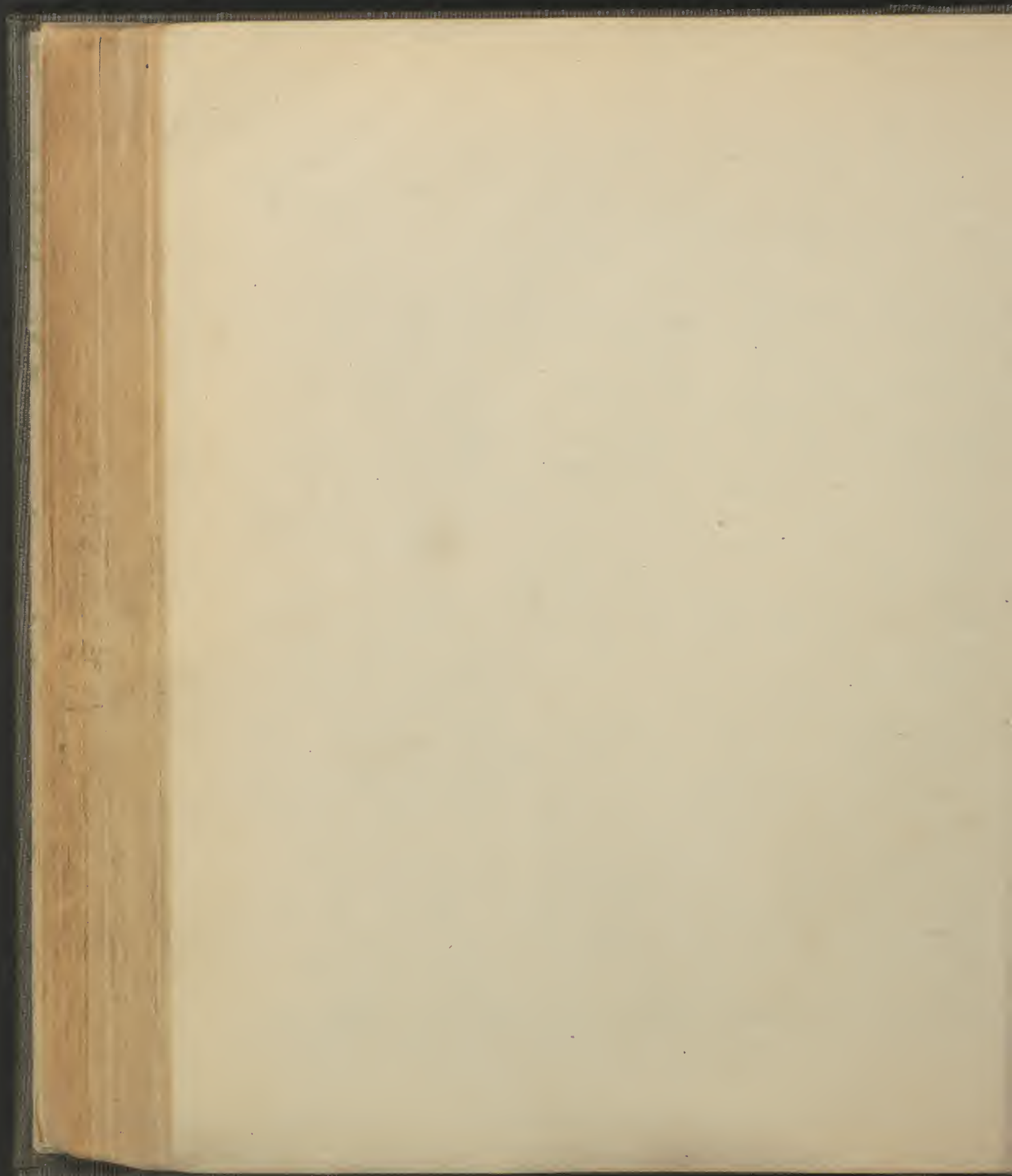
(d). The *Ligamentum Arcuatum Intermedium* arches over the *psoas magnus* muscle from the apex of the transverse process of the 1st or 2^d lumbar vertebra to be lost in the crura of the same side.

(e). The Right crus arises tendinous from the front of the bodies of the 2^d, 3^d & 4th lumbar vertebrae.

(f). The Left crus arises tendinous from the front of the bodies of the 2^d & 3^d lumbar vertebrae; it is also smaller than the right as well as shorter.

5th The *Appearance* which it presents. The muscular fibres of the Diaphragm as they are making for the centre become tendinous, so that the central portion is a tendon and this tendinous portion being arranged like the clover leaf is known as the trefoil or central tendon, presenting a right leaflet, a left leaflet and a middle leaflet.

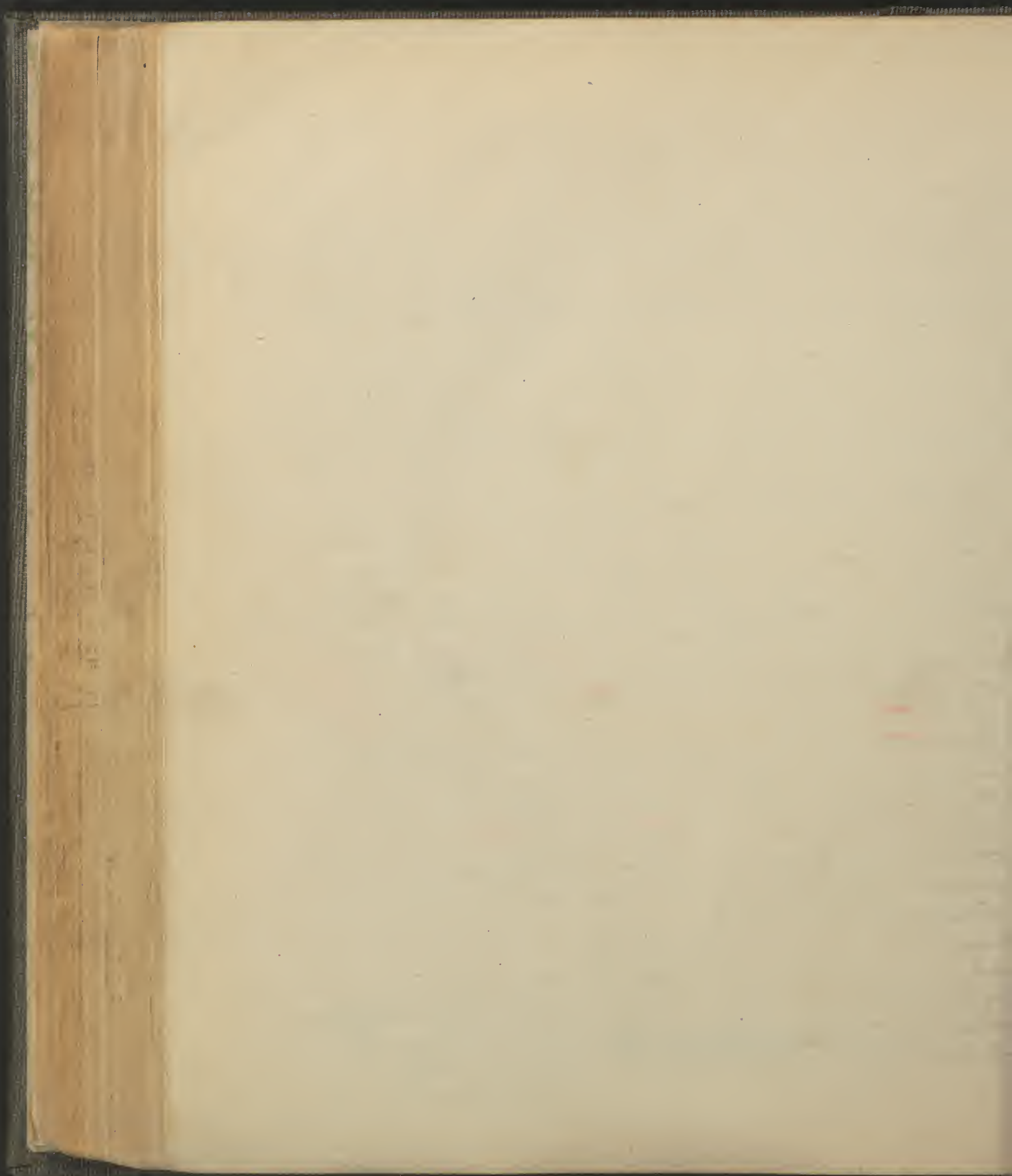
The Diaphragm is pierced by three large apertures these are for the descending aorta, and *vena azygos major*, Thoracic Duct and sometimes *Sub. lym.* Subra, the ascending *vena cava* and for the *Oesophagus* and *Pneumogastric nerves*. As stated the crura arise tendinous from the front of the vertebral column, but ascending they soon become fleshy, leaving a slight interval, now over the 12th Dorsal vertebra each crus gives off from its inner side a bundle of fibres which cross obliquely to join the opposite crus, the one from the right crus being usually in front, this interchange of fibres is known as the decussation of the crura and this decussation leaves between its commencement and the vertebral column an opening which is the aortic; which is in front of the centre of the body of the 12th



Dorsal vertebra and is behind the Diaphragm. The
decurating fibres after they have passed into the op-
posite end again separate from each other leaving an
opening around which they again unite this is the
oesophagus opening, it is situated above the aortic be-
tween it and the middle leaflet of the tendinous cen-
tre opposite the 10th dorsal vertebra. The opening for the
inferior or ascending vena cava is seen to the right of
the middle line. Between the right and middle leaflets
of the tendinous centre. opp. 9th vertebra.
16th Action. - The Diaphragm is a respiratory muscle
and an agent of expulsion. When the Diaphragm con-
tracts, as it does 18-20 times a minute, it descends
becoming less arched and thus increasing the size
the thoracic cavity while it decreases the size of the
abdominal cavity, this latter is however compensa-
ted by the bulging of the anterior wall of the abdo-
men, but should it be necessary to exert a straining
effort as in crying, sneezing or faces or in parturition
the muscles of the anterior abdominal wall contract
at the same time that the Diaphragm does, so that
the abdominal cavity is lessened both from above
downward and from before backward and its viscera
subjected to compression. When the Diaphragm re-
laxes it again ascends thus again lessening the
size of the thoracic cavity.

Nov 24-91
- Quadratus Lumborum.

The quadratus lumborum is a quadrilateral mus-
cle found in the posterior abdominal wall, in the
lumbar region lying beside the vertebral column.
It arises from the last rib and descends, being at-



Lies between two layers of post-abdom. glands.

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Attached by its inner edge to the transverse processes of the lumbar vertebrae, to be inserted into the crest of the ilium and the ilio lumbar ligament.

Action - It draws the vertebral column to one side and is an expiratory agent by drawing down the last rib.

- Muscles of the Upper Extremity -

- Anterior ^{Thoracic} Region - Three Muscles -
- Pectoralis Major -

The pectoralis major derives its name from its position on the front of the thorax (pectus the breast), and from the fact that there is another muscle smaller than it in the same region. It is coarse in structure, triangular in shape, its base being within and apex without and it arises fleshy from the sternal two-thirds of the clavicle, from the front of the sternum (its whole length) from the cartilages of five ribs, i.e. all the true ribs except the first and last this origin being by fibres which reinforce the muscle as it passes over the cartilages, and from the aponeurosis of the external oblique muscle of the abdomen. The fibres converge outwardly, those from the clavicle passing almost perpendicularly downward, those from the lower part of the sternum and from the aponeurosis of the external oblique ascending obliquely outward and the intervening fibres passing horizontally outward, they all terminate in a folded tendon which is inserted into the anterior acromioclavicular ridge of the humerus. As the fibres are approaching their termination some fold over the others,

Folds raised from the calcareous membrane

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those from the lower portion of the origin of the muscle pass behind and from the upper part of the tendon, those arising from the clavicle pass in front of the others and from the lower part of the tendon.

Action - It draws the humerus across the chest.

Summary - Origin - From the sternal $\frac{2}{3}$ of the front of the clavicle, from the front of the sternum (its whole length) from the cartilages of all the true ribs except the 1st and the 7th and from the aponeurosis of the external oblique muscle of the abdomen.

Insertion - Into the anterior bicipital ridge of the humerus by a folded tendon.

Nov. 14 91
- Pectoralis Minor -

The pectoralis minor derives its name from its situation on the front of the chest and from the fact that there is another muscle in the same region of larger size - It is found beneath the pectoralis major, is triangular in shape, oblique in direction and small - It arises from the front of the 3^d, 4th & 5th ribs passing outward and upward, fleshy it narrows to a tendon which is inserted into the coracoid process of the scapula - near the axilla

Action - Rotates the scapula on the thorax and when the scapula is fixed it aids in expanding the chest.

Nov. 14 91
- Subclavius -

The subclavius derives its name from its position, just beneath the clavicle; it is a small round muscle arising from the cartilage and possibly adjacent osseous portion of the 1st rib by a tendon it passes horizontally outward becoming fleshy and almost

Markheim's Infra-ocular 1

immediately, after it ceases to rise it begins to be inserted, its belly being extremely short; its insertion is into the whole length of the groove on the under surface of the clavicle (this groove occupying about the middle $\frac{1}{3}$ of the clavicle.)

Action - It draws the clavicle downward -

Thoracic Surgical Triangle - Nov. 4

Lying just beneath the subclavius, which is sometimes given as its upper limit, is a triangular space of great surgical importance - Its boundaries are; above, the clavicle; below, the upper edge of the pectoralis minor; its apex is without and is crossed by the axillary vessels and nerves; its base is within and is formed by an imaginary line drawn from the inner extremity of the clavicle to the commencement of the origin of the pectoralis minor -

(- Lateral Thoracic Region - One Muscle -)

- Serratus Magnus - Nov. 13

The serratus magnus is a large thin muscle found upon the side of the chest - it derives its name from its extensive origin by means of digitations or serrations -

It arises by 9 serrations from the anterior surface of the 8 upper ribs; the lower 5 of these serrations interdigitating with the external oblique of the abdomen and two of the serrations arising from one rib, the 2^d - Its origin is fleshy and it continues its course fleshy, outward and backward over the side of the chest to be inserted into the anterior edge of the posterior border of the scapula its whole length -

Action - It moves the scapula on the thorax and

Auxiliary Δ

Boundries & Situation

Its apex directed towards root of the neck. Base out-ward & down. It is formed by integument & fascia & extends from the lower border of the Pect. mag. in front and lower part of Lat. dorsi behind. It is broad at the chest but narrow behind. anterior Boundary is Pect. mag. and minor mus. Post. Boundary — is lower than the ant. border & is the Sub. Scap. above the teres mag. and lat. dorsi below. on inner side is the Sem. str. musculus

next Page

when the scapula is fixed it moves the ribs.

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(The Acromial Region - One Muscle -)

- Deltoid -

The Deltoid is a large coarse triangular muscle forming the bulge of the shoulder and deriving its name from the resemblance to the Greek letter Δ . It arises from the clavicle (outer $\frac{1}{3}$) from the acromion process and from the whole length of the spine of the scapula; passing downward flexing it converges to a short tendon which is inserted into the "Deltoid" V of the humerus about half way down its outer face. Action - Raises the humerus; (i.e. abducts it and by its posterior fibres can carry it backward or by its anterior fibres forward.

- Scapular Group - Five Muscles -

- Subscapularis -

The subscapularis is a coarse flat muscle occupying the subscapular fossa; it arises from the whole of the fossa except a small portion, near the superior and inferior angle and a narrow strip along the posterior border where the coracohumeral ligament is inserted; it passes upward and outward towards the neck of the scapula, gathered into fasciculi these being separated by partitions of its investing fascia which reach attachment to the oblique ridges on the fossa and some muscular fibres also spring from this fascia and these partitions. The muscle ceases to rise from the fossa for the last $\frac{1}{3}$ of its course and narrows to a tendon as it approaches the humerus and is inserted into the lesser tuberosity of the humerus and the bone below

and the four ribs & three inter costal
muscles

on the out side where the ant.
and Post boundaries converge the
space is narrow and bounded
by the humerus the coraco Brach-
-ilus and the Bicip mus.

This space contains the Brach-
-ilus plexus of nerves - lymphatic
glands and arteries.

— FINIS —

The base of this space is the
skin & fascia between the lower
boundaries of the space

for about an inch -

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Action - It is an inward rotator of the humerus -

- Supra-Spinous -

The supra-spinous (or spinatus) muscle lies in the supra-spinous fossa on the dorsum of the scapula. It arises from the fossa (and as the spine forms a part of this fossa it consequently rises from the upper surface of the spine) and from its investing fascia; the muscle passes forward beneath the acromion process, narrows to a tendon and is inserted into the uppermost of the 3 facets on the greater tuberosity of the humerus - For the last 3d of its course the muscle receives no accession of fibres from the fossa -

Action - It aids the Deltoid in raising (abducting) the Humerus -

- Infra-Spinous -

The infra-spinous (Spinatus) arises from the infra-spinous fossa and its investing fascia, passing upward and forward it narrows to a tendon which is inserted into the middle facet on the greater tuberosity of the humerus - As the lower surface of the spine of the scapula aids in forming this fossa the muscle also derives fibres from it - The muscle obtains no origin from the last 3d of the fossa -

Action - It is an outward rotator of the humerus -

- Teres Minor -

The teres minor lies along the lower edge of the infra-spinous muscle from which it is separated by a septum of fascia - It arises from the upper 2/3 of the in-



humus.

~~Y. G. G. G.~~
Lay. best of line

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illary border of the scapula and ascends to terminate in a tendon which is inserted into the lower facet on the greater tuberosity of the humerus.

Action - It is an adductor and rotator of the humerus.

- Teres Major -

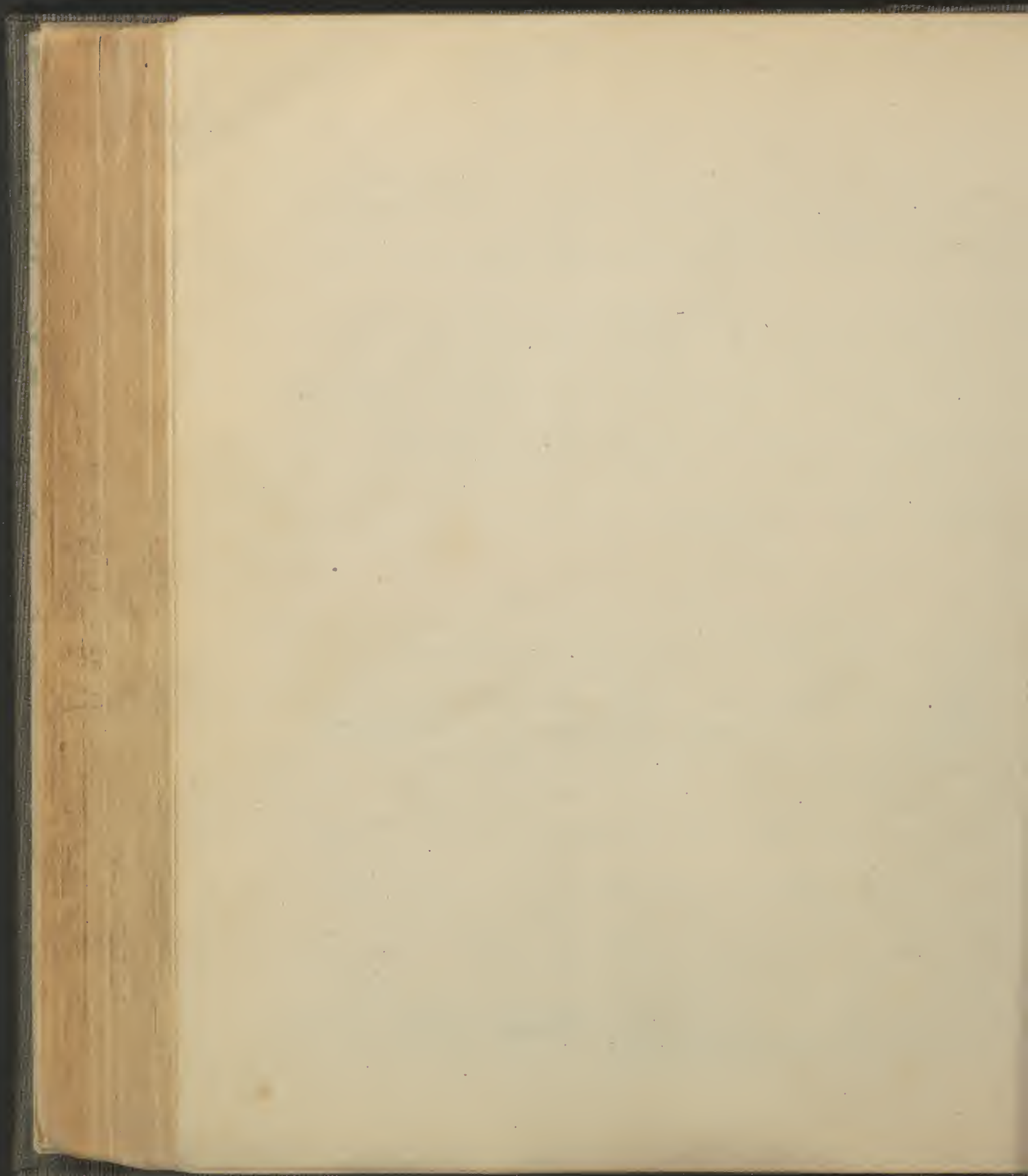
The teres major lies just below the teres minor from which, after its origin, it is separated by a widening interval. It arises from a small portion of the lateral border of the scapula near its inferior angle and from the lower $\frac{1}{3}$ of the axillary border and passing upward and outward is inserted by a flat tendon into the posterior bicipital ridge.

Action - It draws the humerus downward and backward.

- Surgical Triangle -

Between the two teres muscles is a triangular space whose base is the humerus and whose sides are, above the lower border of the teres minor, below the upper border of the teres major. Now this triangle is subdivided by the long head of the triceps into a quadrangular space whose sides are, humerus, long head of the triceps, teres minor and teres major and into a smaller triangle whose base is the long head of the triceps and whose sides are the teres minor and teres major.

- The Muscles of the Humerus or Arm. Four -
When the skin and two layers of superficial fascia have been removed from the arm (that part of the upper extremity between the shoulder and elbow) there is exposed a strong fibrous membrane called the deep fascia which forms a complete investment



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for the limb binding down the muscle and sending in from its inner surface a septum to the external condyloid ridge and another to the internal condyloid ridge to separate the muscles on the front and back of the humerus these are known respectively as the external and intermuscular septa. The muscles of the arm are divided into two groups, anterior and posterior.

Nov. 29 91
Anterior Humeral Group - Three Muscles.
- Biceps Flexor -

The biceps, as its name indicates has a forked origin arising by two tendons, one its short head from the coracoid process of the scapula the other the long head from the upper border of the glenoid cavity of the scapula from these two origins the belly of the muscle is formed which descends on the front of the arm to the elbow where it terminates in a tendon which after giving off a slip from its inner side to the deep fascia of the fore-arm is inserted into the bicipital tuberosity of the radius. - Post. Jaw

Action - It flexes the fore-arm, i.e., draws it forward and upward on the arm and is also a supinator of the fore-arm - the arm being brought slightly in and turned flexed on act of direct of back of humerus.

- Coraco-brachialis -

The coraco-brachialis is a small muscle which arises in common with the biceps from the coracoid process of the scapula, descending on the inner side of the biceps and adherent to its short head for several inches it is inserted into a vertical ridge on the inner surface of the humerus, about its middle.

Brachialis
Anterior

Nov 20/91

- From lower 1/2 of external shaft of 1st
- " " 1 1/2 of external " " "
- " internal submuscular septum
- " whole length
- " small part of external intermuscular septum upper part
- " 2 ^{small} very small digitations
- subcap bellied V

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Action - It flexes the arm, i.e. raises it forward, and it can also carry the arm inward across the chest -

Nov. 20th 91
- Brachialis Anticus -

The brachialis anticus is the fleshy mass which lies beneath the lower part of the biceps on the front of the humerus - It arises by two fleshy digitations which embrace the deltoid "V" from the front of the humerus from the Deltoid "V" to within an inch of the elbow, and from the intermuscular Septa, but to a greater extent from the inner - passing over the front of the elbow joint it is inserted into the coronoid process of the ulna - ^{it has N.B. 91}

Action - It is a flexor of the fore-arm -

Nov. 20th 91
- Posterior Humeral Group - One Muscle -

- Triceps Extensor -

The triceps is the large fleshy mass which covers nearly the whole of the posterior aspect of the humerus and is the only muscle found there - Tracing it from its tendinous insertion into the olecranon process of the ulna upward the belly of the muscle is seen to be produced by the union of three fleshy masses about the middle of the humerus, these are called its three heads, inner, outer and middle or long - The inner head is the shortest, it arises from the inner half of the posterior aspect of the humerus from the insertion of the teres major to the internal condyle and from the internal intermuscular septum - The External head arises from the outer half of the posterior surface of the humerus from the insertion of the teres minor to the external condyle and from

P.P. P.P. P.P. P.P. P.P.
P.P. P.P. P.P. P.P. P.P.

Q. R. 11
V. B. 11
L. 11

Burdett
Loring Graham

P.B.M.

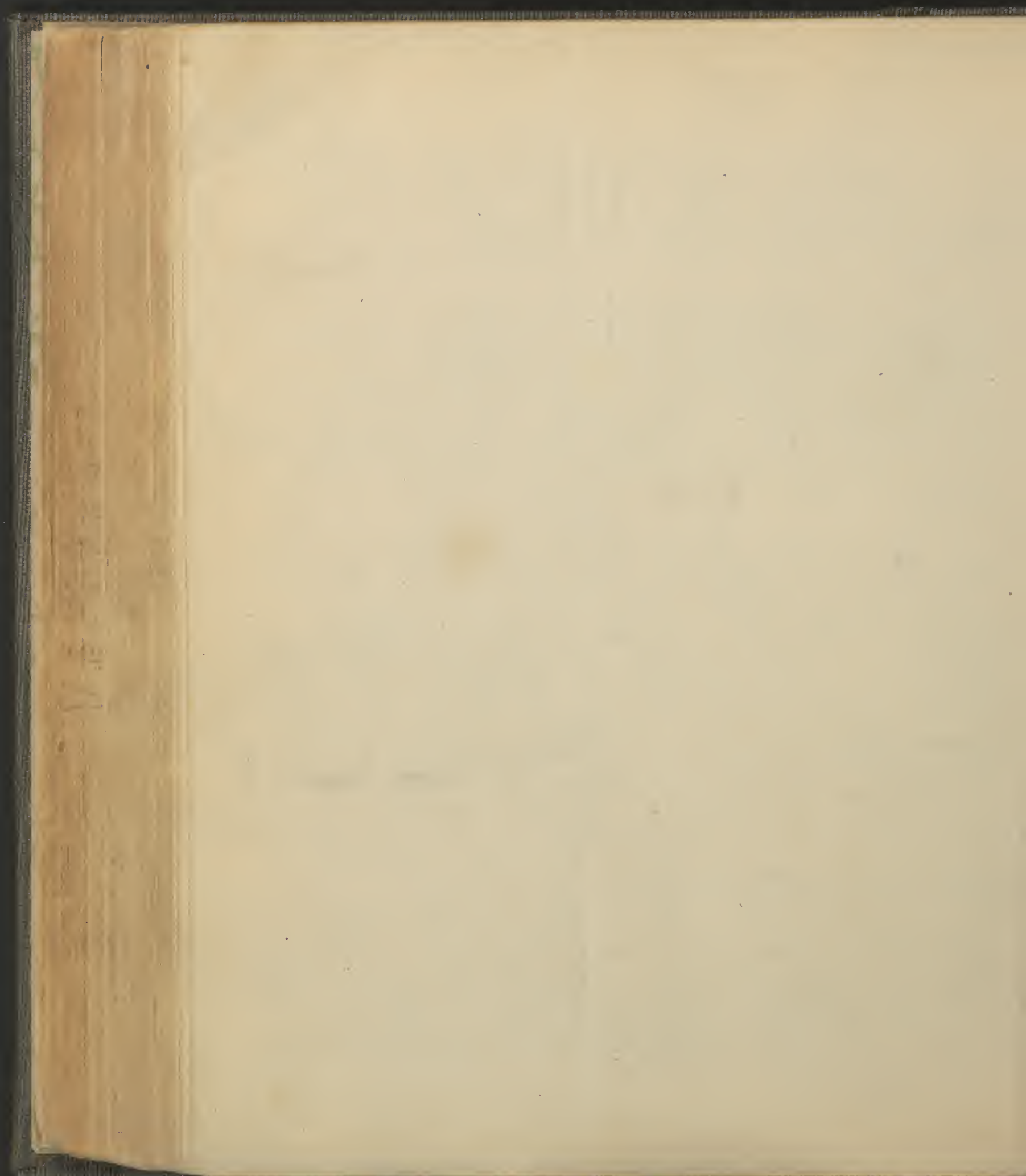
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the external inter-muscular septum - The Middle
or Long Head arises by a flat tendon from the upper
inch of the acillary border of the scapula -
Action - It extends the fore-arm on the arm -

- The Muscles of the Fore-arm -
The muscles of the fore arm are divided into three
on the front and three on the back of the fore-arm -
The deep fascia of the arm is continued over the elbow
and invests the muscles of the fore arm, giving off muscular
from its inner surface septa, known as intermuscu-
lar or dividing septa which separate the muscles
from each other -

- The Muscles on the Front of the Fore-arm - Eight -
The muscles on the front of the fore-arm have for their
action the production of the following movements -
Either 1st Pronation, which is a revolution of the ra-
dus around the ulna thus turning the palm of the
hand downward or backward (for the anatomical
portion of the fore-arm exists when the palm of the
hand looks forward); or 2^d Flexion of the hand at
the wrist; i.e. raising the hand forward on the fore-
arm); or 3^d Flexion of the Fingers on the hand or at
their inter-phalangeal joints (i.e. a movement for-
ward of the finger at the said joints) or 4th Flexion
of the Thumb on the hand -

To produce pronation there are two muscles called
pronators and to distinguish them one is called
the round pronator - (teres), the other the square pro-
nator (quadratus). To produce flexion at the wrist-
joint there are three muscles, two of these are known as



flexors of the carpus (i.e. hand), the third has an unfortunate name being called palmaris longus; these three muscles lie side by side the palmaris longus being in the middle (and should be called the middle flexor of the hand), the two flexors are distinguished not as external and internal as they should be but the outer one is called radialis because it lies on the radial side the radius being the outer bone and the inner one is called ulnaris because it is on the ulnar side.

To produce flexion of the fingers there are two muscles one upon the other and hence they are known as the superficial flexor of the fingers (flexor superficialis digitorum) and deep flexor of the fingers (flexor profundus digitorum); both of these sending a tendon each to every one of the four fingers.

To produce flexion of the Thumb there is one muscle on the front of the fore-arm, the long flexor of the thumb (flexor longus pollicis) "Long" to distinguish it from a short flexor of the thumb found in the hand) These muscles, on the front of the fore-arm seem to have a preference as a long origin to the internal condyle of the humerus; many of them also take an origin from the deep fascia, for this deep fascia adheres to the muscles closely for several inches, say three below the elbow; of course no muscle can arise from the deep fascia which is not superficial at the upper part of the fore-arm where the fascia is adherent to the muscles. Another origin for some of these muscles is the intermuscular (or dividing) septa which the deep fascia gives off from its inner surface. Now many muscles springing from these several points, they furnish what

area was arising from 3 cm of
^{2nd}
~~1st~~ condyle of h will be the
Superficial prop up to S.D.

Primary Section!
Pharyngeal Section
See ~~but~~ page

That shiny substance is nothing but the
corrosive fascia of bone.

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is known as the common origin for the muscles on the front of the fore-arm; this common origin ^{is} thus started "internal condyle", intermuscular septa and "deep fascia".

The muscles on the front of the fore-arm are divided into four layers -

- First or Superficial Layer - Four Muscles -

- Pronator Radii Teres -

The pronator radii teres has a double origin from the common origin and from the coronoid process of the ulna; it is inserted into the middle third of the oblique line of the Radius -

- Flexor Carpi Radialis -

The flexor carpi radialis arises from the common origin and is inserted into the base of the metacarpal bone of the index finger; its tendon grooves the trapezium bone & passes under the annular lig.

- Palmaris Longus - "Tendon of the palm"

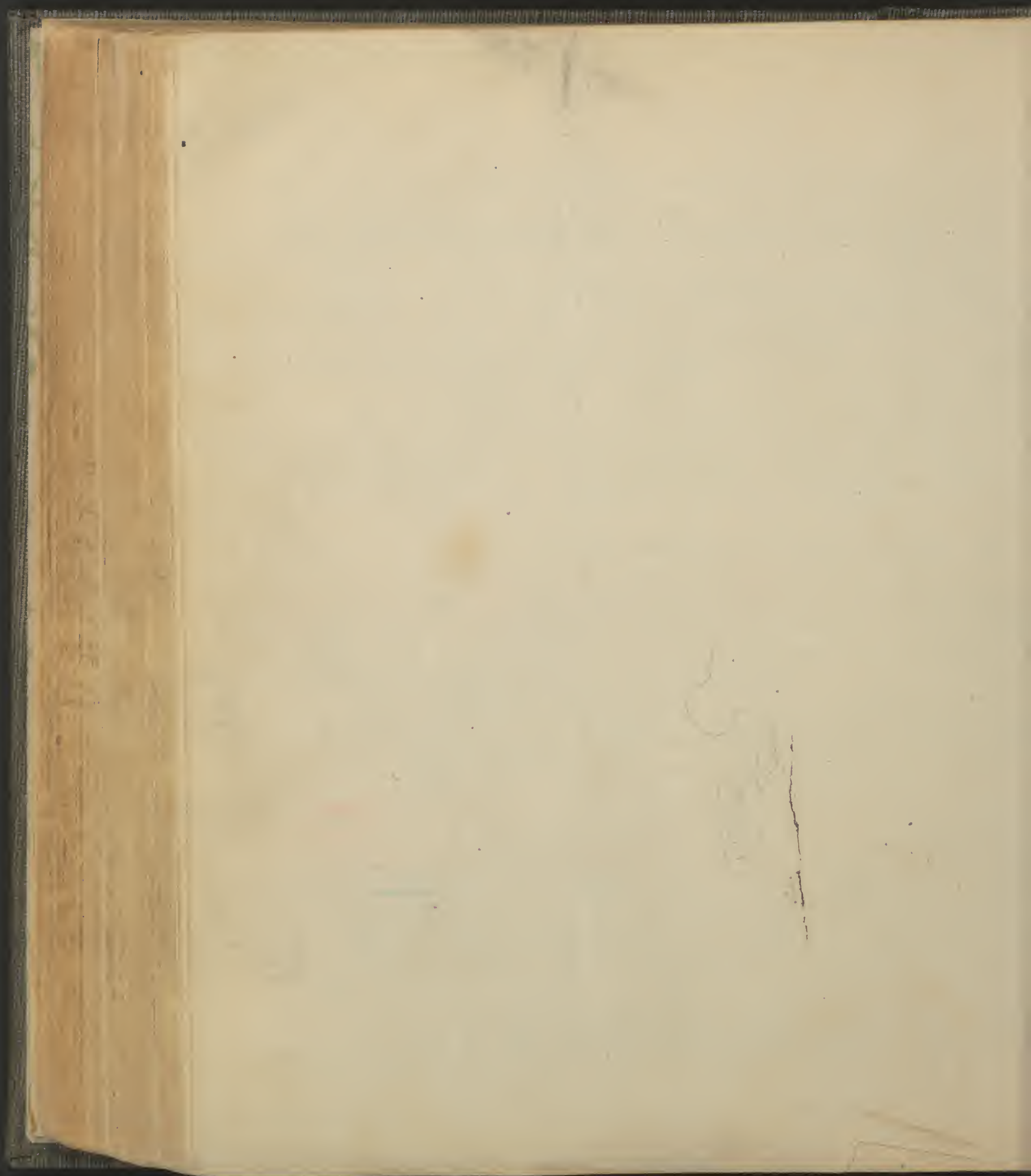
The palmaris longus arises from the common origin and is inserted into the palmar fascia and anterior annular ligament - & palmar fascia -

- Flexor Carpi Ulnaris -

The flexor carpi ulnaris arises from the common origin, from the inner side of the olecranon and from the upper $\frac{2}{3}$ of the posterior border of the ulna (by a strong aponeurosis); it is ^{inserted} into the pisiform bone and base of the metacarpal bone of the little finger -

- Flexor Sublimis Digitorum -

The flexor sublimis digitorum has five points of origin -



4 internal lateral ligament (of the elbow) to the coronoid process of the ulna - 5th the oblique line of the radius (for several inches). The muscle descends beneath the superficial layer and dividing into four tendons at the lower part of the fore-arm these enter the hand and proceed one to each finger to be inserted into the sides of the shaft of the second phalanx. It splits at the base of the finger to allow the tendon of the deep flexor to that finger to pass, after which it reunites and then splits again to be inserted into the sides of the shaft of the 2^d phalanx.

- Second Layer - Three Muscles -

- Flexor Profundus Digitorum -

The flexor profundus digitorum lies just beneath the flexor sublimis and to the ulnar side of the next muscle; it arises from the upper $\frac{2}{3}$ of the ulna and from the ulnar part of the interosseous membrane, dividing into four tendons they pass into the palm of the hand and separating run one to each of the fingers to be inserted into the base of its last phalanx.

- Flexor Longus Pollicis -

The flexor longus pollicis lies to the outer side of the preceding muscle, arising from (about) the middle $\frac{1}{3}$ of the front of the Radius and from the radial part of the interosseous membrane it is inserted into the base of the last phalanx of the thumb.

- Pronator Quadratus -

The pronator quadratus as its name imports is

Mus. on back of face and
on the back & sides

3 groups
1 group. 4 more not groups

dist. area from Mus. septin

quadrilateral, occupying about the lower fourth of the front of the two bones it thus presents the origin of the two preceding muscles for that distance.

It arises from the inner side of the ulna and receives a few fibres from its front and is inserted into the front of the Radius as far as its outer side.

The Interosseous membrane mentioned above is a strong fibrous membrane stretched across the interval between the radius and ulna and forming as it were an origin for muscles as bone economizes weight.

The Muscles of the posterior aspect of the Fore-arm - Twelve - The muscles on the back and outer side of the fore-arm are divided into three groups each containing four muscles - Their actions are the reverse of those on the front, i. e. the reverse of pronation which is supination and of flexion which is extension, their names being indicative of their action - Like the muscles on the front, these have a favorite bony origin the external condyle of the humerus and the deep fascia here also adheres closely to some of the muscles for several inches below the elbow furnishing a point of origin for each, and giving off dividing or intermuscular septa which are also points of origin - So that there is here also a common origin for several muscles, composing external condyle, investing fascia and intermuscular septa -

-(Radial Group) Four Muscles -

Radial
out groups

- Supinator Longus -

The supinator longus derives its name from its action and from the fact that there is a second supi-

on front of mus. section
~~from~~ ^{between} (Basilian art.)

Remains were attached to corn. land.

arises from the corn. land?
indicated by a mound from which
fossils were taken.

motor shorter. It arises from the upper $\frac{2}{3}$ of the external condyloid ridge and from the external intermuscular septum and after descending for about $\frac{1}{3}$ of its course terminates in a tendon which is inserted into the base of the styloid process of the Radius.

- Extensor Carpi Radialis Longior -

The extensor carpi radialis longior derives its name from its action, an extensor of the hand, from its position, on the radial side of the fore-arm and from the fact that there is another shorter muscle with the same action on the same aspect. It arises from the lower third of the external condyloid ridge of the humerus and from the external intermuscular septum and descends to be inserted by its tendon into the base of the metacarpal bone of the index finger.

- Extensor Carpi Radialis Brevior -

The extensor carpi radialis brevior, deriving its name from facts stated with the preceding muscle, arises from the common origin and is inserted into the base of the metacarpal bone of the middle finger.

- Supinator Brevior -

The supinator brevis arises from the external condyle from the external lateral ^{and} orbicular ligaments and from the ulna (its triangular depressed surface) and oblique ridge) and winding around the radius is inserted into the upper third of its oblique ridge.

- Superficial Group - Four Muscles -

Extensor communis Digitorum -

The extensor communis digitorum derives its name

3 have the common origin

all the yellow gold of the
except China & Japan

1844 London is not cutaneous -

London is not cutaneous -

from its action as the extensor common to the four fingers: it arises from the common origin and descending divides into four tendons which are each inserted into the whole length of the back of a finger. At the back of the wrist these tendons are bound down by an oblique fibrous band called the posterior annular ligament which crosses from the annulus to the outer side of the wrist.

- Extensor Minimi Digiti - ①

The extensor minimi digiti is an off-shoot from the common extensor and as its name imports its action is to extend the little finger separately: it is inserted into the whole length of the back of the little finger along with the slip furnished to that finger by the common extensor.

- Extensor Carpi Ulnaris - ①

The extensor carpi ulnaris derives its name from its action as an extensor of the hand and from being on the ulnar side of the forearm - It arises from the common origin and from the posterior border of the ulna its middle (thick) cord is inserted into the base of the metacarpal bone of the little finger.

- Anconeus ① Tricorvus

The anconeus is a small triangular muscle, arising by its apex from the external condyle of the humerus it is inserted by its base into the olecranon and triangular surface of the apex or trinity of the ulna. - Action - It aids the triceps tensor in extending the forearm.

Deep Group - Fore Muscles - ①

all to make more complete.
But cautious

from the Port on by to reach the Eliza
the width of the level of 1st floor of
to say that when the section sheet



The four muscles comprising this group lie under the muscles of the superficial group and all arise from the interosseous membrane as one attachment.

As indicated by their names they are all extensors, three being appropriated by the thumb and one by the Index finger.

Quia

Polisio

— Extensor Opis Metacarpi Pollicis —

The extensor opis metacarpi pollicis arises from the radius, interosseous membrane and ulna and is inserted into the base of the metacarpal bone of the thumb.

— Extensor Primi Internodii Pollicis —

The extensor primi internodii pollicis arises from the radius and interosseous membrane and is inserted into the base of the first phalanx of the thumb.

Action — It is an extensor of the first phalanx of the thumb.

— Extensor Secundi Internodii Pollicis —

The extensor secundi internodii pollicis arises from the ulna and interosseous membrane and is inserted into the base of the last phalanx of the thumb.

Action — It is an extensor of the second phalanx of the thumb.

— Extensor Indicis —

The extensor indicis arises from the ulna and interosseous membrane and is inserted into the whole length of the back of the index finger blending with the tendon furnished that finger by the common extensor.

Action — It is the proper extensor of the four finger.

3 divisions

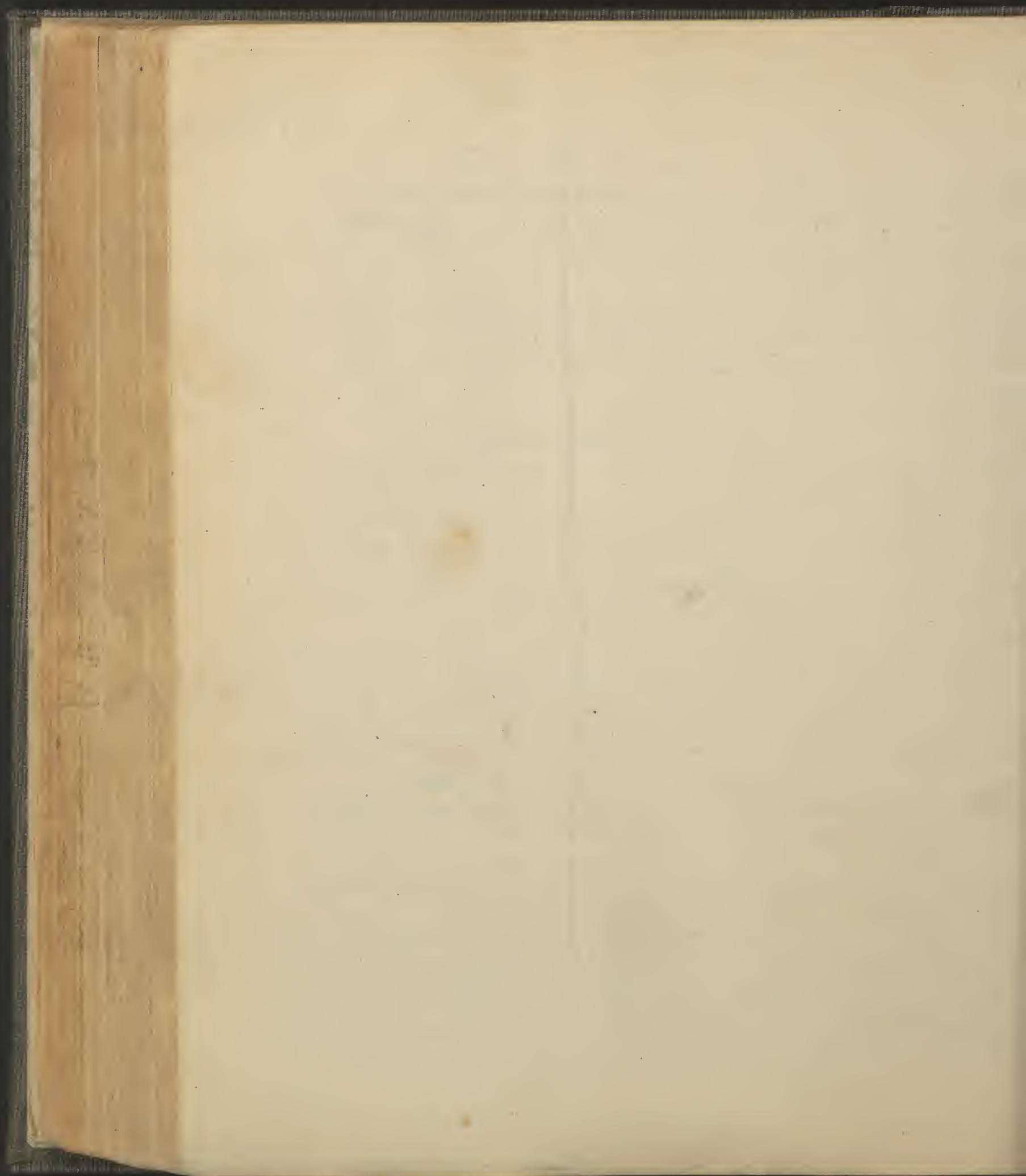
- Posterior Annular Ligament -

Is an oblique fibrous band passing downward and inward across the back of the wrist from the lower extremity and styloid process of the radius to the cuneiform and pisiform bones; it holds the extensor tendons down on the bones and moreover gives off from its deep face septa, which being attached to the bones make up compartments through which the tendons thus separated pass.

- The Muscles of the Hand -

The central portion of the palm of the hand is seen to be depressed below the level of an eminence extending from the base of the little finger upward toward the wrist called the *Hypothenar eminence* and a more bulging eminence extending upward from the base of the first phalanx of the thumb toward the wrist called the *Thenar eminence*.

When the skin has been removed from the palm of the hand beneath it is found a thick layer of fatty tissue which serves as a protection for the vessels and nerves in grasping with the hand. After removing this fat a layer of fascia is exposed called the *palmar fascia* which is found to have a thicker central portion and two thinner portions covering the muscles which produce the *thenar* and *hypothenar* eminences. Tracing this palmar fascia to the wrist it is found to be continuous there with a strong fibrous band which extends across the wrist from one side to the other binding down the flexor tendons which pass beneath it, and known as the *anterior annular ligament*. The muscles of the hand consist of two groups the *Thenar* and *Hyp-*



prothenar group and four small muscles found in the depressed portion of the palm called the lumbales.

Thenar Group - Four Muscles. Nov 21

The muscles of the thenar commence are appropriated to the movements of the thumb which are easily verified to be as follows, (a) Abduction, a movement of the thumb outward from the index finger (b) Adduction, a movement in the opposite direction, viz, to carry the thumb inward to the side of the index finger (c) Flexion, a movement in which the thumb is brought in contact with the pulp of any finger and in which the metacarpal bone of the thumb is put in motion, this is effected by a muscle called the opponens (opponens muscle of the thumb) (e) Extension, which is effected by muscles on the back of the fore-arm and which have been described. It will be found that the muscles which produce these varied movements have received names indicative of their actions.

-- Abductor Pollicis. Nov 21

The abductor pollicis arises from the trapezium bone and annular ligament (anterior) and is inserted into the outer side of the base of the first phalanx of the thumb.

Flexor carpi Metacarpi Pollicis. Appended

The flexor of the metacarpal bone of the thumb or the opponens pollicis arises from the trapezium bone and annular ligament and is inserted into the whole length of the metacarpal bone of the thumb along its radial border.

Alcedo M. Dy. rivis from
Boston

- Flexor Brevis Pollicis -

The flexor brevis pollicis consists of two parts one arises from the trapezium bone and annular ligament (the superficial portion); the other from the trapezoid and os magnum and Base of Metacarpal bone of Mid- ^{And the center of shaft of 1st metacarpal bone} finger (the deep portion): it is inserted into both sides of the base of the first phalanx of the thumb, its tendons of insertion having sesamoid bones in them.

Adductor Pollicis -

The adductor pollicis is a flat triangular muscle, arising by its base from the whole length of the front of the metacarpal bone of the middle finger, it is inserted into the inner side of the base of the first phalanx of the thumb.

Hypothenar Group - Four Muscles -

Palmaris Brevis -

(The palmaris brevis is a small pale muscle lying just beneath the skin of the palm; it arises from the anterior annular ligament and palmar fascia and passing forward about an inch wide is inserted into the skin on the inner border of the hand.)

- Abductor Minimi Digiti -

The abductor minimi digiti arises from the pisiform bone and is inserted into the inner side of the base of the first phalanx of the little finger.

Action - It is an abductor of the little finger, that is, it draws the little finger inward away from the ring finger.

Flexor Brevis Minimi Digiti

The abductor minimi digiti arises from the pisiform bone

U - bone

Lunulacala

arise from base of deep flex. line
mark = line around the radial side
of 1st phal. & is connected to
radial side and dorsum of
finger

and annular lig.

225

from bone and is inserted into the inner side of the base of the first phalanx of the little finger -

Action - It is an abductor of the little finger, that is, it draws the little finger inward away from the ring finger.

Flexor Brevis Minimi Digiti. 21 Nov

The flexor brevis minimi digiti arises from the unci-
form process of the unciiform bone and annular liga-
ment and is inserted into the base of the first pha-
lanx of the little finger.

Action - It is a flexor of the little finger.

Adductor Brevis Metacarpi Minimi Digiti.

The adductor brevis metacarpi minimi digiti arises from the unciiform process of the unciiform bone and annular ligament and is inserted into the whole length of the metacarpal bone of the little finger.

Action - It draws the metacarpal bone of the little finger outward and forward carrying the little finger toward the thumb (and hence is called *opponens digitorum* and are inserted into the radial border of the extensor tendons on the back of the finger.

The Insertion of the Flexor Tendons of the Fingers
Tracing the tendon of the flexor sublimis digitorum to any one of the fingers it is found to split so as to leave an interval through which the deep flexor tendon passes, each side of the split tendon is inserted into the side of the shaft of the second phalanx, the tendons giving off before its insertion numerous thread-like prolongations which are called *vincula accessoria* and are inserted into the side of the finger. Both tendons

2 compartments ant + Post.

deep and superficial, are held down on the finger their whole course by ligamentous fibres which are called thecal.

- The Muscles of the Lower Extremity -
The muscles of the lower extremity are divided into those of the hip, of the thigh, of the leg, and of the foot ("and the two flexors of the thigh, see p. ") - The Hip is called the gluteal region -

- The Gluteal Region - Three Muscles -
As in the upper extremity as in the lower the muscles are covered by an investing fascia which is here much thicker and is known on the thigh as the Fascia Lata (or vagina femoris) - The muscles of the gluteal region are nine in number and arranged in three layers; each layer having a muscle called "gluteus" -

First Layer - One Muscle -

- Gluteus Maximus -

The gluteus maximus is a quadrilateral muscle, the largest and coarsest in the body and forms the bulge of the buttock - It arises from the posterior $\frac{1}{5}$ of the crest of the ilium, from the dorsum ilii between the superior curved line and crest, from the posterior surface of the sacrum and coccyx and from the greater sacro-sciatic ligament - It passes obliquely downward and outward to be inserted into the line leading from the trochanter major to the linea aspera of the femur and into the fascia lata -

Action - It is an abductor and outward rotator of thigh, a tensor of the fascia lata and steadies the

The upper part part of the *Quaternary* is not covered

(11)

Coarser in alt. part with *quaternary* is not free out edge

These 2 kinds are separated ^{by} and
adherent to the *stratification*

pelvis on the femur - & produces the fold of the skin

Dec 1st - Second Layer. Deep Muscles - { = all covered with Gluteus Max except it
Gluteus Medius -

The gluteus medius is partially covered by the gluteus maximus: arising from the anterior $\frac{4}{5}$ of the crest of the ilium, from the foramen ili between the superior and middle curved lines and from its anterior face it is inserted into the outer part of the trochanter major.

Action - It is an abductor and outward rotator of the thigh, steadies the pelvis on the femur and aids in carrying the lower extremity forward in progression.

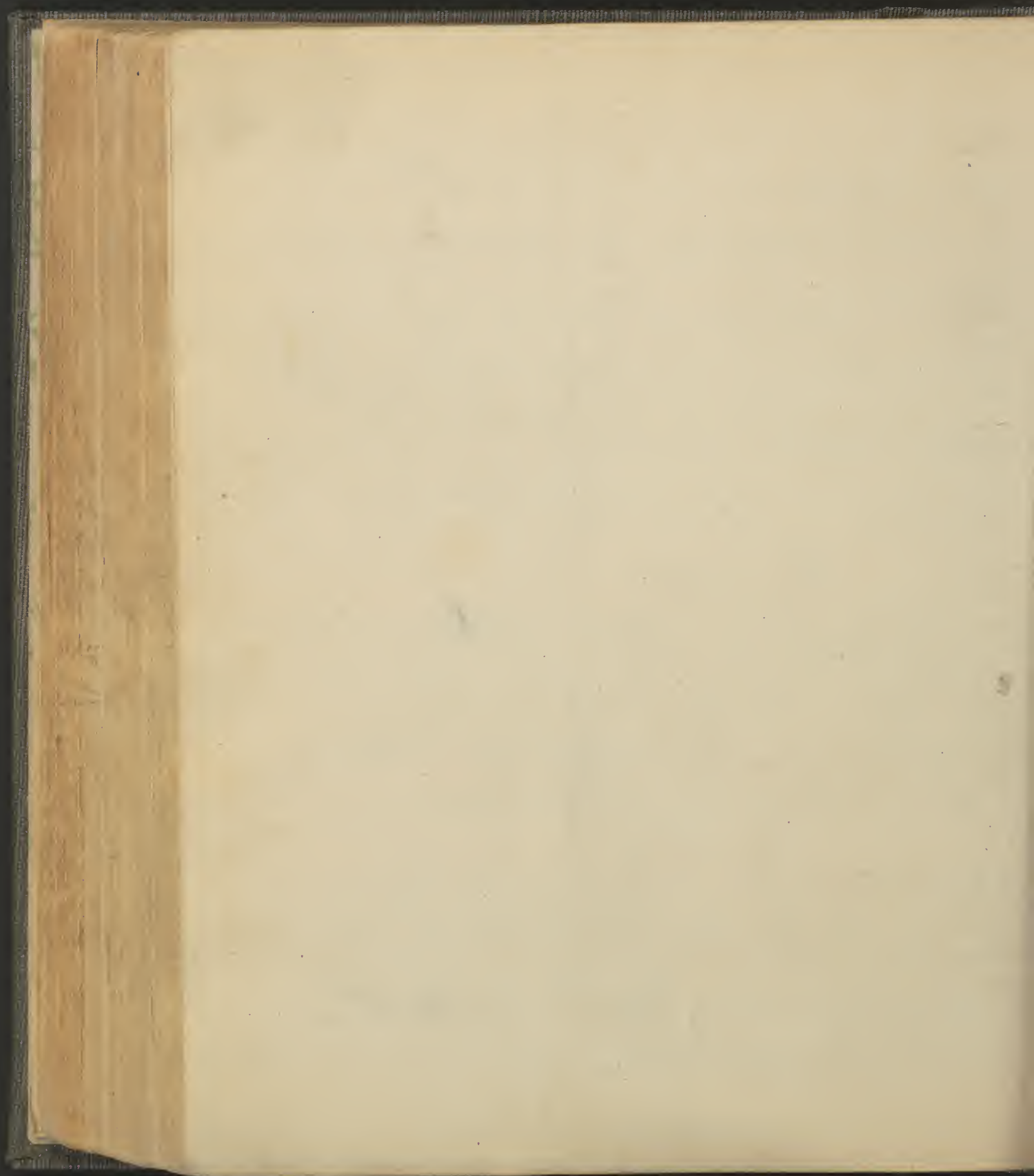
Dec 1st - Piriformis -

The piriformis as its name implies is a pear-shaped muscle, which arises in the pelvis by three fleshy gripes interposed between the anterior sacral foramina from the 1st to the 4th and from the adjoining part of the ilium and escaping from the cavity of the pelvis through the greater sacro-sciatic foramen is inserted into the trochanter major. digital fossa. cond tendon.

Action - It is an external rotator of the thigh.

Dec 1st - The Gemelli -

The gemelli are a pair of small muscles lying one above and the other below the tendon of the obturator internus. The Gemellus Superior arises from the spine of the ischium and is inserted into the digital fossa of the trochanter Major. The Gemellus Inferior arises from the tuberosity of the ischium and is inserted into the digital fossa.



Both are outward rotators of the thigh-

- Obturator Internus-

The obturator internus arises within the pelvis, from the inner surface of the obturator foramen, from the margin of the obturator foramen and from the inclined plane of the ischium. Its course is downward and slightly backward until becoming tendinous it escapes from the pelvis through the lesser sacro-sciatic foramen and passing horizontally outward is inserted into the digital fossa of the trochanter major. Action - It is an outward rotator of the thigh.

- Quadratus Femoris-

The quadratus femoris, as its name indicates is a square muscle lying below the tendon of the obturator internus. It arises from the tuberosity of the ischium and is inserted into the linea quadrati (post: Inter-trochanteric line) (a rough ridge on the posterior part of the trochanter major).

Action - It is an outward rotator of the thigh.

Third Layer - Two Muscles-

- Gluteus Minimus-

The gluteus minimus lies beneath gluteus medius and maximus; it is a triangular radiated muscle arising from the dorsum Ilii between the middle and inferior curved lines it descends narrowing to be inserted into the trochanter major. Action - It is an abductor and inward rotator of the thigh acting from below it steadies the pelvis on the femur.

Obturator Externus-

miss from wchi's Fabric Room

Oblurator Externus.

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The obturator externus arises from the outer surface of the obturator foramen (its inner $\frac{2}{3}$) and from the margin of the obturator foramen, narrows to a tendon which passing outward behind the neck of the femur is inserted into the digital pit of the trochanter major.

Action - It is an external rotator of the thigh.

Dec 1st

Posterior Femoral Region - Three Muscles.

The muscles of the thigh are placed in four groups viz - posterior, superficial, anterior and internal femoral groups. Inverting the thigh as before stated is a thick strong fibrous membrane lying just beneath the skin and superficial fascia, descending to the knee it envelops the joint and passes on to become the investing fascia for the muscles of the leg. From the hip-joint to the knee-joint it is known by three names, investing fascia of the thigh, or vagina femoris or generally fascia lata - It not only forms a resisting firm covering for the muscles but sends in between the groups septa two of these dividing septa, being attached to the external and internal lips of the linea aspera are known respectively as the external and internal intermuscular septa. The fascia lata moreover consists of two layers between which are found some (three) muscles of the thigh called the superficial muscles. The posterior femoral muscles have a common origin from the tuber ischii and are all three flexors of the leg, i. e. they raise the leg backward on the thigh.

Biceps Femoris -

B

Not $2/3$ but the whole length
of the outer lip of the
tendon before
it is not more than a few

Sim mem. in as much as it has a broad
tendon and although it is inserted in
front of the semi tendinosus bulges
back so as to form a guide in
operations on the back of the knee
joint

Biceps femoris

Biceps fliq. curis.

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The biceps, as its name imports, has an origin by two heads, the long head springs in common with the semitendinosus muscle from the tuberosity of the ischium. descends adherent to the semitendinosus for several inches and is joined by the short head which arises from the ~~lower lip~~ ^{its upper back part} of the outer lip of the linea aspera and from the external intermuscular septum and the muscle after descending to the lower $\frac{1}{3}$ of the femur in contact with the semitendinosus leaves it and makes for the outer side of the knee joint and is inserted into the head of the fibula, chiefly (but sends some fibres to the outer tuberosity of the tibia and fascia of the leg.

Dec 1

relates to some one above at one or other joint.

--Semitendinosus--

The semitendinosus as above stated arises in common with the long head of the biceps adheres to it for several inches then descends in contact with it to the lower $\frac{1}{3}$ of the femur where it leaves it and descending toward the inner aspect of the knee joint is inserted into the inner surface of the shaft of the tibia below the inner tuberosity and sends a slip to the fascia of the leg - (i.e. it is one element of the goose-foot insertion, vide p.

Dec 1

-Semi-membranosus-

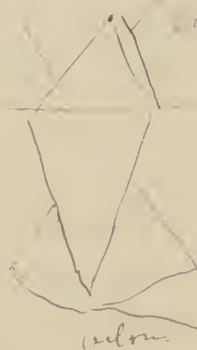
The semi-membranosus arises from the tuberosity of the ischium just in front of the two preceding and descends in company with them to the lower $\frac{1}{3}$ of the femur whence it accompanies the semi-tendinosus towards the inner aspect of the knee-joint and receives a three-fold insertion, into the horizontal

pieces

abm

semi-membranes
as it bulges into space.

one 3 same



below

infant knee joint

gastrocnemius

groove on the inner tuberosity of the tibia, into the popliteal fascia and into the posterior ligament of the knee joint.

(The Biceps is known as the outer hamstring muscle. The inner hamstring muscles are the semitendinosus and semimembranosus.)

-- Popliteal Space --

On the posterior aspect of the knee-joint is a surgical space known as the popliteal; it is diamond-shaped having an angle above, another below and two lateral. It is formed by the divergence of the posterior femoral muscles from each other superiorly and by the convergence of the two heads of the gastrocnemius muscle inferiorly. Its boundaries are as follows; its outer sides are formed, the upper by the biceps, the lower by the outer head of the gastrocnemius; its inner sides are formed, the upper by the semitendinosus and semimembranosus, the lower by the inner head of the gastrocnemius. Its angles are formed as follows; the superior by the divergence of the posterior femoral muscles (at the lower $\frac{1}{3}$ of the femur); the inferior by the union of the two heads of the gastrocnemius; the external lateral by the intersection of the semitendinosus and semimembranosus with the inner head of the gastrocnemius.

The floor of this space is formed by three parts; the upper part its floor is the posterior aspect of the lower $\frac{1}{3}$ of the femur; the middle portion is the posterior ligament of the knee-joint; the lower portion is the popliteal fascia covering the popliteus muscle. (The last portion corresponds to the upper $\frac{1}{5}$ of the

Glutis medius is adherent to the
muscle by its ant edge.

glutis medius

-lybia.)

The importance of this space results from the fact that there pass through it from above downward (a) a large nerve (b) a little deeper a large vein & (c) deepest of all a large artery; all three called Popliteal.

^{Superficial mus. of the thigh}
 Superficial Femoral Group - Three Muscles - Exam. 90 91.
 As before stated these three muscles all lie between two layers of fascia lata -

Tensor Vaginae Femoris -
 The tensor vaginae femoris is short and flat lying on the outer aspect of the thigh and between the layers of the fascia lata; it arises from the crest of the ilium near the anterior superior spinous process descends with an inclination backward and is inserted into the fascia lata ^{between the layers} about $\frac{1}{4}$ down the thigh.

Action - It is a tensor of the fascia lata and aids to ^{move} the limb -

Sartorius -

The Sartorius muscle is the longest muscle in the body; it arises from the anterior superior spinous process of the ilium and ^{about} half the notch below, passes obliquely downward and inward across the upper $\frac{1}{3}$ of the thigh, descends vertically behind the inner condyle of the femur, then turns obliquely forward to be inserted into the inner face of the tibia below the inner tuberosity sending a slip to the fascia of the leg. It forms one of the three elements of the goose-foot insertion, the other two being the semitendinosus and Gracilis. The insertion of each being given



in this case, front of the tibia below the inner tuberosity and sends a process to the fascia of the leg. Of the three muscles at their insertion, the sartorius is the most superficial, then the gracilis and lastly the semitendinosus.

Action - It flexes the thigh on the pelvis, the leg on the thigh and carries the leg inward across the other.

- Gracilis -

The gracilis arises from the edge of the symphysis pubis and from the margin of the rami of the pubes and ischium by a thin broad tendon and descends flexing the inner aspect of the thigh to be inserted, as one element of the goose-foot insertion, into the inner surface of the tibia, just below the inner tuberosity and sends a process to the fascia of the leg.

Action - Flexes the leg on the thigh and aids in adducting the thigh.

- Anterior Femoral Region - Five Muscles.

The muscles in the anterior femoral region are usually described as five, but they can very readily be considered as three, the *Triceps Flexor Femoris*, consisting of the *Psoas Magnus* and *Iliacus Internus* and the *Triceps Extensor Cruris* consisting of *Rectus Femoris*, *Vastus Extensus* and *Vastus Internus*. The three last named being inserted by a common tendon, known as the *Ligamentum Patellae*, into the anterior tubercle of the tibia their action being transmitted through the patella to which they are attached. As might be inferred from their action they all arise from points somewhere near a perpendicular to their in-

W. H. W.
233
H B
C H

Biceps flexus manus

The tendon slips going from the
upper edge of the rectus to the
lower edge of same (cf. from
lip to lip. — viz. over the construction
portion of the body of a rectus

There is a bursa between the con-
joint tendon of these muscles.
Also a bursa behind it which some
have seen with high point.

action - Some make 4 muscles here by subdividing one and call them *Quadriceps extensor*.

Psoas Magnus -

The *Psoas Magnus* is a long spindle-shaped muscle lying beside the vertebral column and descending into the thigh. It arises from the bodies and transverse processes (bases) of the last dorsal and all the lumbar vertebrae, from the intervertebral dist. between them and from tendinous arches attached to the bodies of the vertebrae, these tendinous arches are each attached to the body of one vertebra arching from the upper lippled edge to the similar lower edge of the body of the vertebra thus leaving between it and the central constricted portion of the body an interval through which vessels and nerves pass. The muscle descends along the inner of the pelvis and as it is passing beneath Poupard's ligament into the thigh it is joined by the next muscle the *iliacus internus* and then blended tendon is inserted into the trochanter minor of the femur and the linea aspera for an inch below.

Action. It is a flexor of the thigh on the pelvis.

Iliacus Internus -

The *iliacus internus* arises from the iliac fossa from the internal lip of the crest of the ilium and by a few fibres from the capsular ligament of the hip-joint; it blends with the *psoas magnus* and is inserted into the trochanter minor of the femur and the linea aspera for an inch -

Scapula Δ

There is a fissure in the upper back part
of the rostrum internal for passage of
cord etc.

Pastus. Intus.

Amies.

out lip linea asp
in lip linea asp.
ext. out with into must sept
int
whole shaft of femur begins
at spinal level.

4 - Rectus Femoris -

The rectus femoris derives its name from the straight-
ness of its course; it arises by a forked tendon one
fork springing from the anterior inferior spinous
process of the ilium, the other from the upper lip of
the acetabulum these converge and the tendon
thus formed after a short course terminates in the
belly of the muscle whose fibres have a bipenniform
arrangement, the belly terminates at the lower part
of the thigh in a strong tendon which is inserted
into the upper end of the patella

4 - Vastus Extremus -

The vastus extremus arises from the trochanter ^{its base} ma-
jor, from the outer lip of the linea aspera ^{upper 1/3} and from
the external intermuscular septum and is inserted
into the outer edge of the tendon of the rectus femoris
and outer margin of the patella - or by one an- ^{leg. patella}

4 - Vastus Internus -

The vastus internus arises from the inner face of the
femur from the anterior intertrochanteric line down-
ward, from the front of the femur, from the outer
face from the inner lip of the linea aspera and
from the internal intermuscular septum and is
inserted into the inner edge of the tendon of the rec-
tus femoris and into the inner margin of the pa-
tella - or by leg. patella.

The two vasti muscles form a large fleshy mass
which envelopes the entire femur except the linea
aspera and the two extremities of the bone - That por-
tion of the vastus internus which arises from the



front of the femur is sometimes described as a separate muscle under the name of the crureus muscle.

Internal Femoral Region - Four Muscles -

The muscles of the internal femoral region are adductors of the thigh that is they carry the thigh towards or across its fellow and consequently they must arise somewhere towards the middle line of the body and they do all arise from or near the pubes -

- Pectineus -

The pectineus arises from the pectineal line and triangle of the pubes and passing downward and outward is inserted into the line leading from the trochanter minor to the linea aspera - only its upper part.

- Adductor Longus -

The adductor longus arises from the front of the pubes just below its angle and passing downward and outward is inserted into the ^{middle} ~~middle~~ ^{upper part} of the linea aspera. It and the pectineus form a layer behind which is the adductor brevis -

- Adductor Brevis -

The adductor brevis arises from the body and ramus of the pubes and passing downward and outward to be inserted into the ^{upper third} ~~upper third~~ of the linea aspera - the line leading from the linea aspera to the trochanter minor its whole length.

- Adductor Magnus -

The adductor magnus arises from the sides of the tu-

Also int. cordly. ridge. ⁹²✓

▶ Hunter's Canal ▶

berischu and from the rami of the ischium and pubes and passing downward and outward in large distinct bundles of fibres is inserted into the whole length of the linea aspera ^{its upper lip of body + into condyle} and by a rounded tendon into the internal condyle of the femur. This muscle is pierced by five apertures one above the other, the lowest being much the largest for the transmission of the femoral artery over the termination of which the adductor magnus and longus throw a tendinous arch to the venter internus forming what is called Hunter's canal, over last two inches of the artery.

- Scarpa's Triangle -

On the upper front of the thigh is an important surgical triangle known as Scarpa's; its outer boundary is the sartorius, its inner as the adductor longus, its base is Poupert's ligament, its apex is the intersection of the sartorius and adductor longus. Entering this triangle at the middle of its base and passing through its centre to disappear at the apex are the femoral artery and femoral vein.

Hunter's Canal.

- The Muscles of the Leg -

The muscles of the leg are divided into three regions - 1st Anterior (Tibial) 2^d Posterior (Tibial) 3^d External (or Fibular).

- The Posterior Region of the Leg (or Posterior Tibial) -

Seven Muscles -

The muscles in the posterior region of the leg are placed in two layers superficial and deep.

The sep of the 2 heads only occurs in
abst. in but don't unite until just over 1/2 of the time.

The superficial group. ~~becomes~~ is
called *uticaps ext. 20000*

The tendo ach at its com. comes
nearly the whole of the back of
the leg at its lower part it
is inserted it is very thin

Begins to be lost in the tendo H.

Lower Limb

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- Superficial Layer - Three Muscles -

- Gastrocnemius -

The gastrocnemius is the large muscle which gives shape to the calf of the leg. It arises by two heads from the upper back part of the condyles of the femur and the ^{ridge} ~~ridge~~ which connect condyles with linea aspera - these two heads descend converging as the lower lateral boundaries of the popliteal space, to a point ^{just up} ^{and} unite and form the belly of the muscle along which is continued a groove for some distance; the belly terminates just below the centre of the leg in a large tendon called the tendo Achilles, which is inserted into the lower part of the posterior tuberosity of the calcis, ^{to form part} it being the largest and longest (?) tendon in the body - ^{separated from the rest of the calcis by bursa}

Action - It raises the heel and continuing to act raises the foot.

- Soleus -

The soleus is a large fleshy muscle lying beneath the gastrocnemius it arises from five points from the head and upper half of the posterior aspect of the fibula, from the popliteal line and middle $\frac{1}{3}$ of the internal border of the tibia and from a tendinous arch stretched between its bony origins and descend to terminate about the middle of the leg in the tendo achilles - ^{7 or 8} ^{into the} ^{Septum.}

Action - same as that of the gastrocnemius - These two muscles are sometimes called triceps surae. (Plant.)

- Plantaris

The plantaris is an insignificant muscle lying between the gastrocnemius and soleus - It arises

1774

Pop. belongs to its self as it has its
own pecuniary action. BT.
is bound down or tied by pop. justice

These 3 mus lie below pop. line

3 mus cor. together

from the back part of the external condyle of the femur in common with the external head of the gastrocnemius, the belly of the muscle descending obliquely inward between the gastrocnemius and soleus terminates in a long small tendon which escapes to the inner side of the two muscles and passing down beside the tendo Achillis is either lost in its inner side or is inserted into the posterior tuberosity of the os calcis. Action - Same as that of the gastrocnemius.

- Deep Layer - Four Muscles. Dec 10 1891

- Popliteus - Note short int. lat. lig. of knee joint.

The popliteus is a small triangular muscle resembling the anconeus in the upper extremity; it arises by its tendinous apex from the groove or external condyle of the femur and passing downward and inward, adhering to the head of the fibula and posterior ligament of the knee-joint and the fascia which covers its surface is inserted into the surface of the tibia above and as low as the oblique or popliteal line on its posterior face and into the under surface of the fascia which covers it called the popliteal fascia. (10 pop. A. and also post. lat. lig. of joint) Action - Flexes and rotates the leg in a state of semi flexion.

- Flexor Linguae Pollicis.

The flexor linguae pollicis arises from the lower two-thirds of the fibula except last inch and intermuscular septum ^{the ligament} and descending behind the inner malleolus into the sole of the foot crosses the tendon of the flexor linguae digitorum and is inserted into the base of the last phalanx of the great toe. Action - It flexes the last phalanx of the great toe.

At the 1st meal - the ^{4 almost also} tot. and 17 L. dig enter
port. together, but J. C. policies. ~~the~~ are
to abt, ^{1 in.} ext. to alone mus.

Ten. fls long. dig. to post lie
lyatin behind the ruler not
maleolus
The 1st Polaris Dig.
lies ext to these to on
notch

Flexor Longus Digitorum.

See 100 11

240

The *flexor longus digitorum* arises from the lower two-thirds of the tibia, except last 2 or 3 inches and intermuscular septum, and passing behind the internal malleolus is inserted by four tendons into the last phalanges of the four outer toes - having been crossed by the tendon of the *flexor longus pollicis*.

Action - is indicated by its name.

Tibialis Posterior.

The *tibialis posterior* arises from the whole length of the posterior surface of the interosseous membrane from the adjacent edges of the tibia and fibula and from the intermuscular septum and descending behind the internal malleolus is inserted into the tuberosity of the scaphoid bone and internal cuneiform bone - mostly B.S.

Action - It is an extensor and adductor of the foot. The three last muscles as shown above all arise from the intermuscular septum and all pass behind the inner malleolus; the *flexor longus pollicis* arising from the outer bone of the leg and inserted into the inner toe and the *flexor longus digitorum* arising from the inner bone of the leg and inserted into the outer toes, they must cross each other to reach their destinations and they do so in the sole of the foot, their crossing being called the decussation of their tendons, they being connected at this point by a small slip. The interosseous membrane is a strong ligamentous membrane: passing across the interval between the tibia and fibula and attached to their adjacent edges, after the manner of the interosseous membrane of the

Injection of H₂O Oulens
" " " Lit Potens
Peroneus Supra.

passes through wing lig

fore-arm: this interosseous membrane being entirely appropriated on its posterior face by the tibialis muscle. It should be stressed that the muscles in the deep layer are separated from those in the superficial layer by a strong thick fascia.

- Anterior Region of the Leg - Three Muscles -

Of the three muscles in this region two have some points of origin in common, these four points are 1st at outer tuberosity of the tibia; 2^d investing fascia of the leg; 3^d intermuscular septum - 4th interosseous membrane -

- Tibialis Anticus,

The tibialis anticus arises from the common origin and from the upper two-thirds of the outer face of the tibia and descending terminates in a tendon which passing beneath the anterior annular ligament is inserted into the inner and under surface of the internal cuneiform bone and base of the metatarsal bone of the great toe -

(Action - It flexes the foot and according as it acts with the tibialis posticus or with the peronei it inverts or everts the foot.)

- Extensor Longus Digitorum -

The extensor longus digitorum arises from the common origin and from the head and whole length of the fibula and descending ^{lower 1/3 of leg} divides into five tendons which passing beneath the anterior annular ligament are inserted, one into the base of the metatarsal bone of the little toe, the other four into the bases of the four lesser toes after the manner of extensor

The Peroneus longus lies over the
the " " tibia.

Tendons.

Action. It extends the toes and by its insertion into the metatarsal bone of the little toe it flexes the foot. That portion of the extensor longus digitorum which is inserted into the metatarsal bone of the little toe and which arises from the lower fourth of the fibula, is by some known as a separate muscle and called the *peroneus tertius*.

Extensor Proprius Pollicis.

The extensor proprius pollicis lies between and is overlapped by the two preceding muscles. it is shorter than they; arising from the middle half of the shaft of the fibula and from the interosseous membrane it terminates in a tendon which passing beneath the anterior annular ligament is inserted into the Base of last phalanx of the great toe. Action is indicated by its name.

The anterior annular ligament is a strong oblique ligamentous band which binds the tendons of the three preceding muscles down on the front of the ankle.

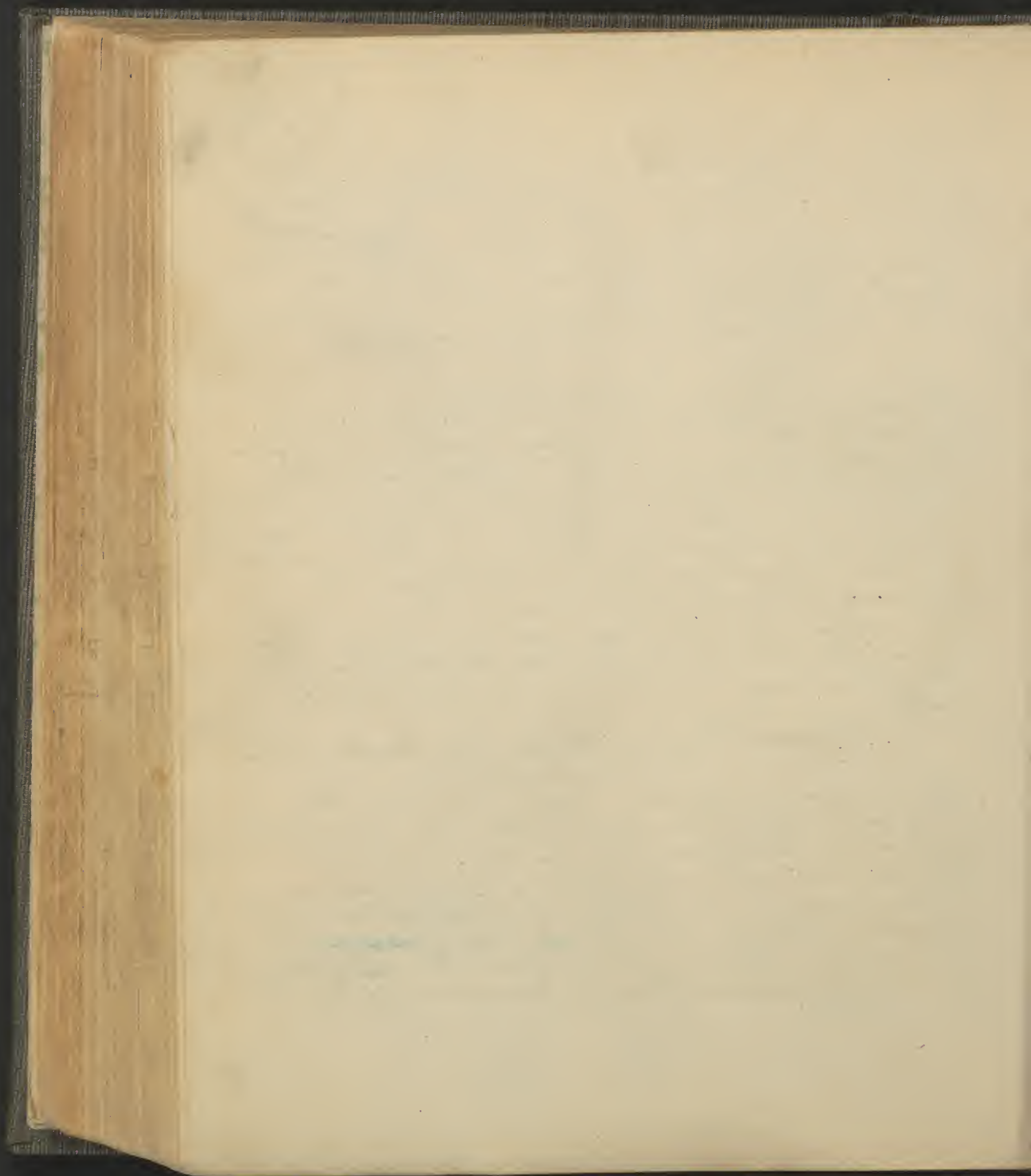
- External Region of the Leg - Two Muscles or Fibula.

Peroneus Longus - Dec 18th

The *peroneus* (or *fibularis*) *longus* arises from the head and upper third of the outer aspect of the shaft of the fibula, from the investing fascia, and from the intermuscular septum, and descending to terminate in a tendon which passing behind the external malleolus (through the lower groove on the outer surface of the or calcis) reaches the sole of the foot and is directed obliquely forward and in-

Letter to Mary 2/4

out border.



ward through a groove in the cuboid bone to be inserted into the base of the metatarsal bone of the great toe -

(Action - It is extensor of the foot)

- Peroneus Brevis -

Dec 1st

The peroneus (or fibularis) brevis derives its name from its position and because both its origin and insertion are short of those of the peroneus longus beneath which it lies; it arises from the lower two-thirds of the outer aspect of the shaft of the fibula and from the intermuscular septum, descending behind the external malleolus (through the upper groove on the outer face of the os calcis) its tendon is inserted into the base of the metatarsal bone of the little toe. *running horizontally forward.*

(Action - It extends the foot) & evert the foot.

The two Peronei muscles as they are passing behind the external malleolus are held down by the external annular ligament & tend to prevent the flattening of the foot. (cf) Vol. I. p. 100.

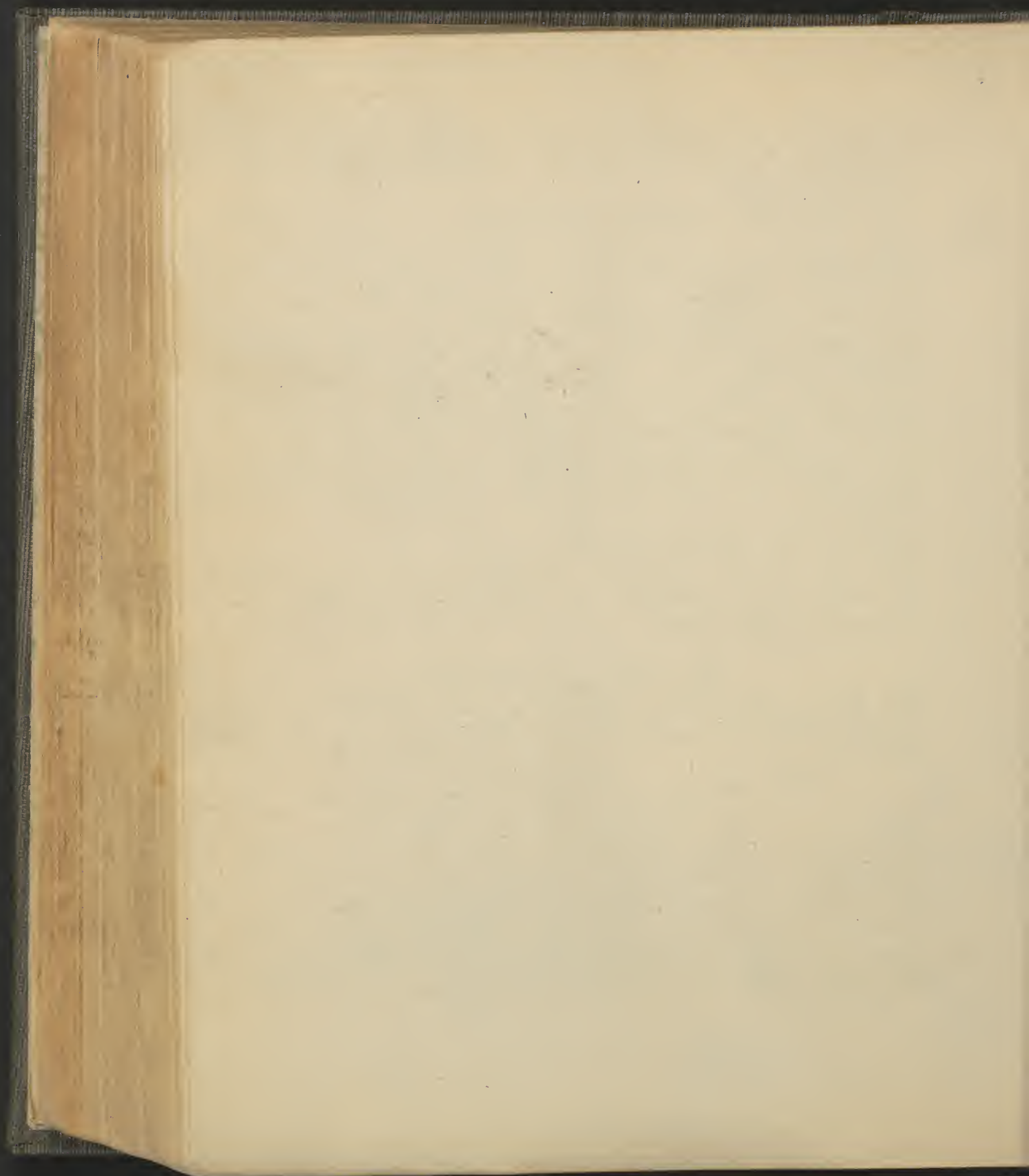
The Muscles of the Foot.

The foot is divided into two regions, the dorsum or back of the foot and the plantar region or sole of the foot.

- The Dorsum of the Foot - One Muscle -

- Extensor Brevis Digitorum -

The extensor brevis digitorum arises from the upper and outer aspect of the os calcis and passing forward and inward divides into four tendons; the innermost tendon is inserted into the base of the first phalanx of the great toe and the three outer into the backs of the three next toes in common with the long



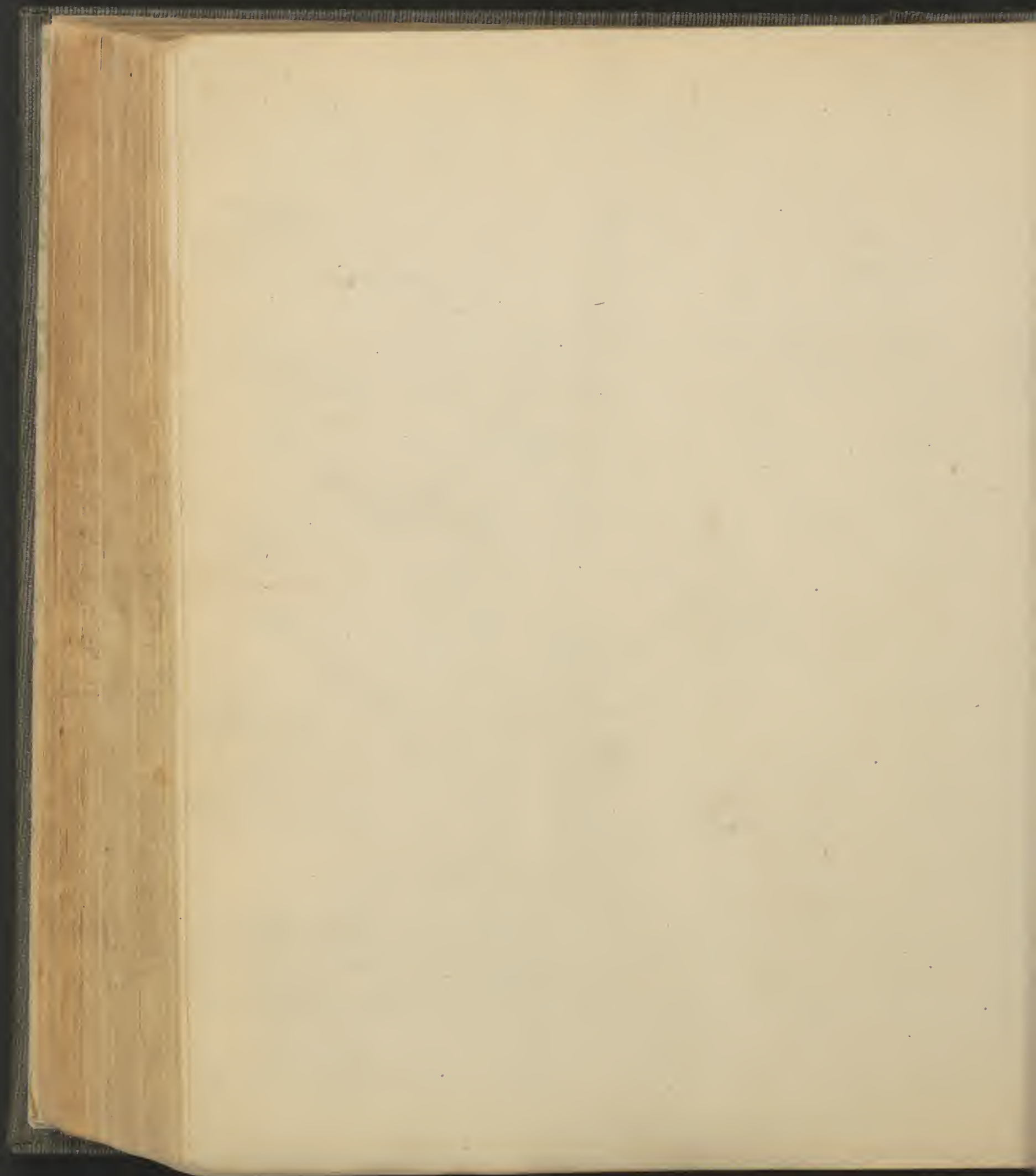
extensor tendons - Its name indicates its action -

Muscles of the Sole of the Foot -

When the thick skin on the sole of the foot has been removed, there is brought to view a thick mass of fatty tissue and beneath this is found the proper fascia of the sole called the plantar fascia, which consists of a thick strong central portion and on either side of this but continuous with it a thinner lateral portion; the central portion beginning at the under surface of the os calcis behind runs forward, widening as it advances and just beyond the middle of the sole dividing into five branches each of which passes forward to the base of a corresponding toe; now the muscles of the sole, all lie beneath (or in the erect position above) the plantar fascia and are disposed into groups, in accordance with the subdivision of the plantar fascia, viz. a central group and two lateral groups; and the propriety of this arrangement is strengthened by the fact that these groups are separated from each other by two dividing or intermuscular septa which the plantar fascia sends up to the base of the foot from the line of union between the middle and lateral portions - But in describing these muscles they are taken in layers of which there are three - when the plantar fascia, the dissection of which is the first step, has been removed, the first layer is seen consisting of one muscle in each group, these constitute the second view -

First Layer - Three Muscles -

The three muscles forming the first layer have origin, called their common origin, which are stated in the same terms, all of them arising 1st from the under surface of the os calcis - 2^d from the plantar fascia which



coron them. 3^d from the intermuscular septa which separate them. So that in a properly performed dissection of the plantar fascia it is always left on the muscles for two or three inches forward from the calcis since this part gives origin to muscular fibres.

- Abductor Pollicis -

The abductor pollicis is the innermost of the three muscles in the first layer; arising from the common origin it is inserted into the inner side of the base of the first phalanx of the great toe. Its name indicates its action.

- Abductor Minimi Digiti -

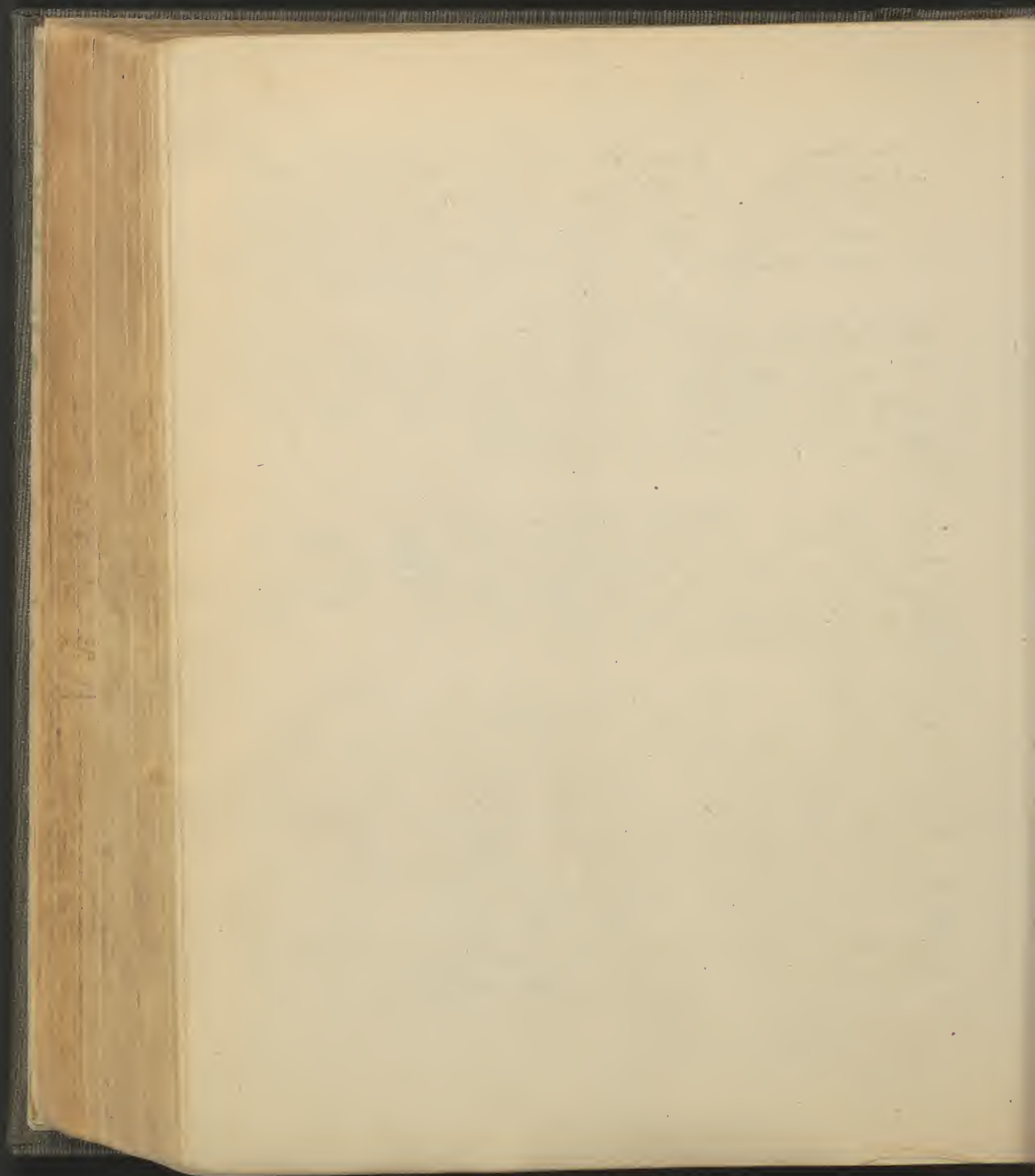
The abductor minimi digiti is the outer of the three muscles in the first layer; arising from the common origin it is inserted into the outer side of the base of the first phalanx of the little toe. Its name indicates its action.

- Flexor Brevis Digitorum -

The flexor brevis digitorum is the centre of the three muscles in the first layer; arising from the common origin it passes forward and divides into four tendons for the four lesser toes. Each tendon splits to allow the passage of the tendon of the long flexor and is inserted into the sides of the shaft of the second phalanx. Its name indicates its action.

- Second Layer - Five Muscles & Two Tendons -

The second layer exposed by removing the first is the third view in the dissection of the sole of the foot; it



consists of the *musculus accessorius*; the four *lumbricales* and the two tendons of the *fleur lingua pollicis* and *fleur lingua digitorum*; these two tendons soon after entering the sole form behind the *interdigital malleolus* cross each other forming what is known as their *decussation* and they are moreover connected as they cross by a slip so that one muscle cannot act entirely independent of the other, but throws the parts into which the other is inserted into slight motion when it acts.

- *Musculus Accessorius* -

The *musculus accessorius* arises *tendinous* and *fleshy* from the *inner surface* of the *calcis* and passing forward is inserted into the *outer side* and *upper surface* of the tendon of the *fleur lingua digitorum* just as it splits into its four branches. *Action* - It corrects the *obliquity* which would otherwise be imparted to the motion of the four lesser toes by the action of the *longa flexor*.

- *Lumbricales* -

The *lumbricales* are four little worm like muscles, three of which arise from the *bifurcations* of the tendons of the *fleur lingua digitorum* and the fourth from the *inner side* of the *inner tendon* of the same and passing between the toes are inserted into the *exterior tendons* of the four lesser toes to their *tibial side*.

Action - They aid the *fleur lingua digitorum*.

- *Third Layer - Four Muscles* -

This layer, constituting the fourth *view* in dissection.

2. 1/2 in. -
some stone for. 1/2 in.

seen on the back of the hand or foot and called hence dorsal interossea and 3 are found on the palmar aspect or in the sole and hence called palmar or plantar interossea - The action of these muscles is to withdraw any finger or any one of the four smaller toes from an imaginary axis passing along the centre either of the middle finger or the toe next the great toe; or on the other hand to carry the finger or toe towards the imaginary axis; the former of these actions is called abduction and is performed by the dorsal interosseous muscles, the latter is called adduction is produced by the palmar or plantar interosseous muscles.

In the hand the dorsal interossei are seen to occupy the intervals between and to arise by two heads from the adjacent aspects, of all the metacarpal bones, passing forward each is inserted into the side of a finger opposite to the imaginary axis; now the middle finger has two dorsal interossei and the little finger none since for the latter the abductor is a muscle of the hypodermic group, the abductor minimi digiti - The palmar interossei as stated are three for each hand; lying between the metacarpal bones for the index and the middle and the middle ring and ring and little fingers they arise each from one metacarpal bone and passing forward are inserted into the finger of the same metacarpal bone on the side next to the imaginary axis there being no palmar interosseous muscle for the middle finger since its two dorsal muscles supply its function.

In the foot the arrangement of the interosseous muscles is similar to that in the hand except that the toe next the great toe has two dorsal and no plantar

arise from sheath of ten. of 70 Long. in long
inf. cal. cut. long.

It lies on the plantar face of metacarpal
bone of little toe.

on toe — 70-91

248

ing the sole, is exposed by removing the second layer.

- Flexor Brevis Pollicis -

The flexor brevis pollicis arises from the ~~cuboid bone~~ ^{mostly} from the ~~external annular bone~~ and from the expanded tendon of the tibialis posterior and is inserted into both sides of the base of the first phalanx of the great toe each tendon having in it a sesamoid bone.

- Adductor Pollicis -

The adductor pollicis arises from the cuboid bone from the sheath of the tendon of the peroneus longus and from the bases of adjoining metatarsal bones (2d 3d & 4th) and is inserted into the outer side of the base of the first phalanx of the great toe. (U) outer sesamoid bone.

- Flexor Brevis Minimi Digiti -

The flexor brevis minimi digiti arises from the base of the fifth metatarsal bone and is inserted into the ~~outer side~~ ^(outer side) of the base of the first phalanx of the little toe.

- Transversus Pedis -

The transversus pedis arises by slips from the heads of the four outer metatarsal bones and passing inward is inserted into the outer side of the base of first phalanx of the great toe. (U) It is an adductor of the great toe. outer sesamoid bone

- Interosseous Muscles -

Lying between the metacarpal bones of hand and metatarsal of the foot are certain small muscles called from their position interosseous; in each member there are seven of these muscles, four of them are

Barclay's notes

* Barclay's notes

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intercourse the imaginary axis of the foot passing through it.

The Outlet of the Pelvis.

The outlet of the pelvis, which in the recent subject is closed by various soft parts, in the skeleton is seen to be surrounded by the following parts; in front it is limited by the pubic arch; behind by the tip of the coccyx; on each side about the centre by the tuberosity of the ischium, running forward from this the ramus of the ischium and pubes and backward from it the greater sacro-sciatic ligament or in the recent subject the lower border of the glutens maximus muscle. In the recent subject the outlet of the pelvis is divided into two portions by a transverse line passing between the anterior edges of the two tuberosities of the ischia, or in other words from the indefinite point on one side where the ramus and tuberosity of the ischium meet to the same point on the other the portion lying in front of this transverse line is called the perineum and that lying behind it the ischio-rectal region.

-Ischio-rectal Region-

The ischio-rectal region is bounded in front by the transverse line, behind by the apex of the coccyx, laterally by the greater sacro-sciatic ligament or the lower edge of the glutens maximus muscle and by the tuberosity of the ischium. It contains three parts to be examined, the anal orifice with its sphincter muscle and on each side of this a subdivision of the region known as the ischio-rectal fossa.

The anus is the termination of the rectum

Amelanchier
albertina

after at 4 - 100 where Perakia Creek crosses the water wall
of the gulch

and is kept habitually closed by the tonic contraction of two muscles called the sphincter, internal and external. The sphincter ani internus was described with the structure of the rectum, it being a muscular ring around the gut formed by an aggregation of its circular muscular fibres about an inch above the anal orifice. Surrounding the anal orifice, which is seen in the centre of the ischio-rectal region, is a thin elliptical muscle called the sphincter ani externus; arising from and about the tip of the coccyx it passes forward just beneath and closely adhering to the skin to surround the anal orifice and be inserted in front of it into a point in the centre of the transverse line, called the central point of the perineum. *helping to form the shape of the perineum.*

Ischio-rectal Fossa.

The ischio-rectal fossa is the triangular or wedge-shaped space lying beside the anus on each side of it -- It is about two inches deep, the base being at the surface and its limits indicated by the anus within, the puberity of the ischium without, the transverse line in front and the lower edge of the glutæus maximus muscle behind; the apex being above and formed by the coming together of the two sides of the space, the inner side being a muscle inserted into the side of the lower part of the rectum and called the levator ani, the outer side being the obturator internus muscle. The levator ani muscle is thin and flat and has a most peculiar origin to understand which some preliminary remarks are necessary. The transversalis fascia, which lies between the transversalis ab-

The Great Hall See on 115/116

transversus muscle and parietal layer of the peritoneum, when it reaches the iliac fossa where it covers the iliacus internus muscle takes the name of the iliac fascia which in its turn when it reaches the brim of the pelvis assumes the name of the pelvic fascia and this descending into the pelvis when it reaches the commencement of the obturator fascia passes down covering the pelvic face of the obturator internus muscle; the other layer called the recto-vesical fascia passes downward and inward to the rectum and base of the bladder - Now just in the interval when the pelvic fascia splits the levator ani muscle rises, having internal to it the recto-vesical layer and external to it with a widening interval between them, the obturator fascia; Besides this origin from the fascia it arises posteriorly from the spine of the ischium and anteriorly from the back of the pubis - The ischio-rectal region thus described is found filled with adipose tissue, the absorption of which in long continued debilitating disease is the cause of the sunken appearance which is then seen on either side of the anus -

Perineum - (In the male -)

The perineum is that subdivision of the outlet of the pelvis which lies in front of the transverse line its limits are, in front, the pubic arch; behind, the transverse line; on each side, the ramus of the pubis and ischium - Crossing along its centre, from behind forward and continued on to the scrotum, is a ridge of the integument called the raphe - Upon careful dissection the perineum is found to be

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The investing face of the Pennine
The form is proved when it
comes on its left and the other
is the cause of the series



The attachments of the investing process
of the Pennine.

formed of the following constituents from the surface
 upward - 1st the integument - 2^d several layers of su-
 perficial fascia, which in our view differ from the
 general superficial fascia found beneath the integ-
 ument everywhere, 3^d a layer of fascia called the ~~superficial perineal~~ ^{perineal} fascia since it is peculiar to the
 perineum being attached to the ramus of the pubes
 and ischium on each side and in front is continu-
 ous with the ducts of the scrotum, posteriorly this
 fascia is attached to nothing but changes its name
 into deep perineal fascia, since it makes a bend on
 itself at the transverse line and runs back toward
 the pubis arch under the name of the ~~deep perineal~~ ^{deep perineal} fascia; separated from the superficial perineal
 fascia by the root of the penis and the muscles con-
 nected therewith; 4th removing the superficial pe-
 rineal fascia then we exposed the root of the penis
 and its muscles; the root of the penis consists of the
 two crura cavernosa attached one on each side to the
 ramus of the pubes and ischium and of the Bulb of
 the corpus spongiosum which lies between these. The
 muscles which are exposed are three pairs - 1st Trans-
 versus Perinei which arises on each side from the
 spot where the ramus of the ischium is continued
 into the tuberosity and passes diagonally inward
 to meet its fellow in the centre; this point where the
 two transversus perinei are inserted into each other
 is called the perineal centre and let it be observed
 that the course of the transversus perinei corresponds
 to the transverse line. (v) base of Δ fig 7 subp.
 2^d Accelerator Urinae. This muscle arises from the
 perineal centre and from a raphe between it and

$$\begin{array}{r} 1.25 \\ 1.75 \\ \hline 2.00 \end{array}$$

$$\begin{array}{r} 7.8 \\ 2 \\ \hline 8.5 \end{array}$$

this not given as deep Personal
 foris simply as the 1 Sig.

the fellow and the greater portion of its fibres surround the corpus spongiosum to meet the fibres of the opposing muscle on the top of the corpus, but some of its fibres posteriorly are inserted into the deep perineal fascia ^{Fig 8} ~~ramus~~ of the pubes while some in front are lost in the corpus cavernosum. Its chief action is to drive the urine forward by contracting on the corpus spongiosum on which is the urethra.

3d. Erector Penis arises from the ramus of the ischium and pubes and passing forward is lost on the upper aspect of the corpus cavernosum. Sides ~~under surface~~ ^{4th}. After removing these muscles and the root of the penis the deep perineal fascia is displayed.

This, as stated, is continuous at the transverse line with the superficial perineal fascia the line of reflection being around the posterior aspect of the transverse perineal muscles - from this point it passes forward to the arch of the pubes attached on each side to the ramus of the ischium and pubes, just below the arch of the pubes it presents a small round opening for the passage of the urethra. When the deep perineal fascia is dissected up it is found to consist of two layers, called the superficial and deep layers of the deep perineal fascia, which is sometimes called the triangular ligament of the pubes. Between the two layers are found blood vessels and nerves and a pair of muscles called the compressors urethrae.

The ~~Compressor~~ Urethrae arise from the point of union between the ramus of the pubes and ischium and running transversely inward divide into two fasciculi which meet those of the opposite muscle and surround the urethra.

5
2
5

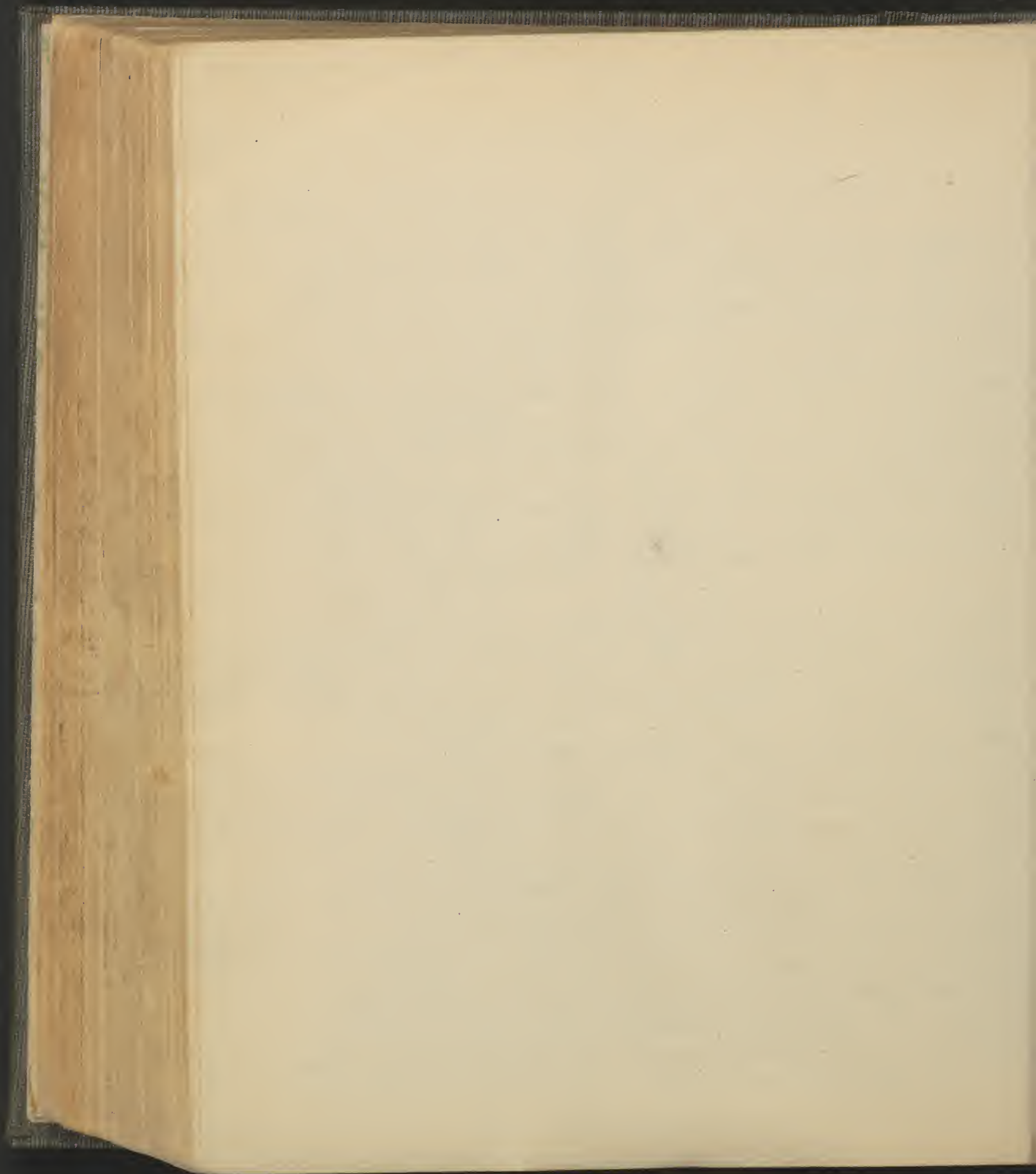
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184

The Vascular System

In the vascular system are comprised three sets of vessels. 1st the capillaries which are minute vessels ramifying in the various structures of the body and in such abundance that were all the other vessels of the heart removed still would there pass on its full and form 2^d the veins which are the channels for the transmission of the blood, deoxygenated on the exit - 3^d the arteries which are the vessels bringing the blood from the heart to the capillaries and which we here first dealt with and then the veins the capillaries being left for consideration in physiology.

The Arteries

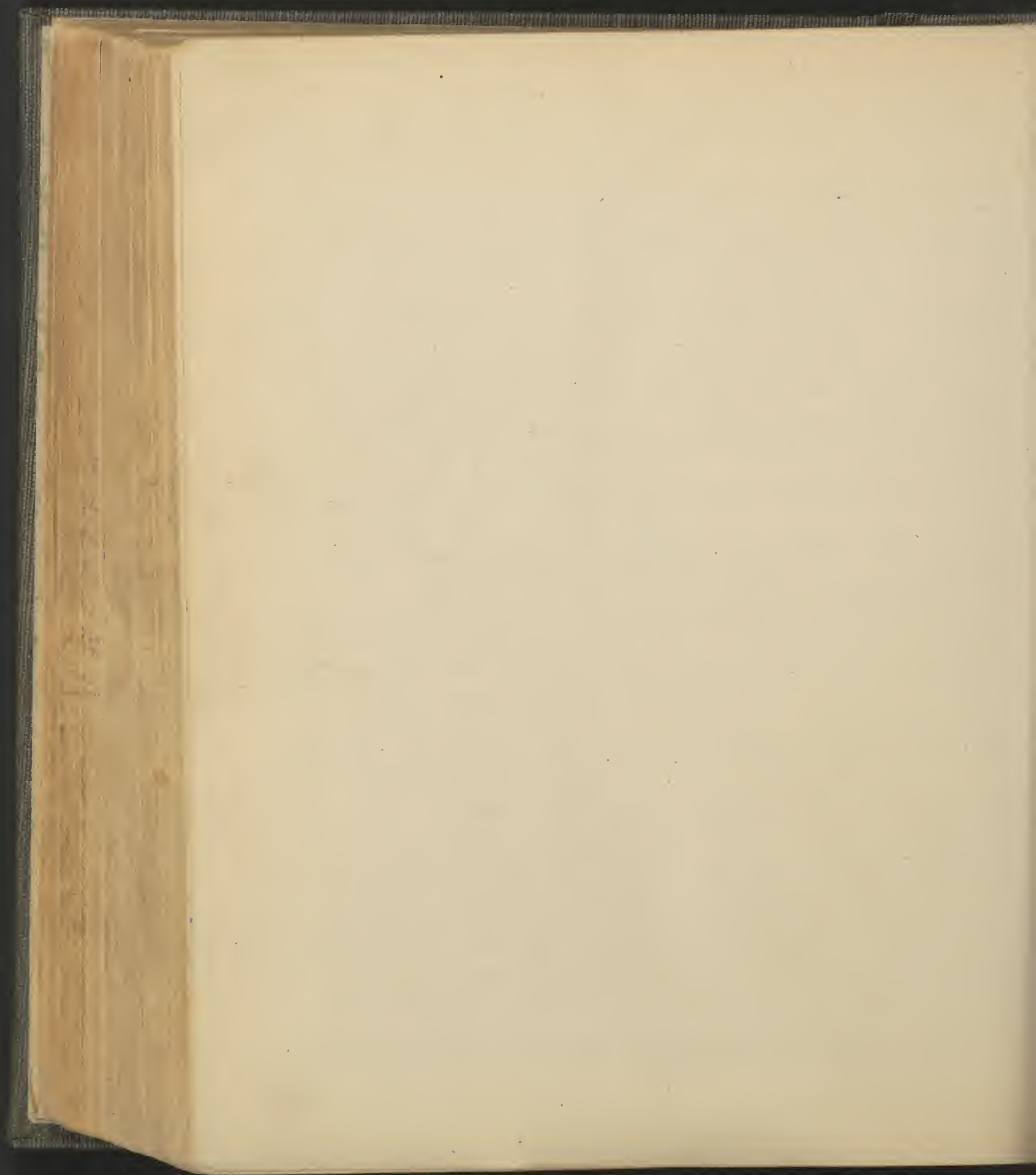
The arterial system consists of two parts, the Pulmonary and the systemic. The Pulmonary is formed by the Pulmonary artery and its branches, conveying oxygenated blood from the right ventricle to the lungs. The systemic arteries comprise the aorta and its descending branches which convey arterial blood from the left ventricle to all the tissues of the body. Proceeding thence the aorta continuously gives off branches and finally terminates by dividing into two branches the aggregate capacity of the arteries which spring from it greatly exceeding its own and if these be traced up it is found that the aggregate calibre of them branching as greatly exceeds their own and as on for each remove from the original aorta so that the aggregate capacity of the arteries terminating in the capillaries is indefinitely larger than the capacity of the aorta from which they are all re-



much dilated: a dilation consequent of this increase in size of the channel which the blood traverses as it is driven from the heart the rapidity of its flow is constantly slackening: now in some arteries a special provision is made to reduce the momentum of the blood current, in order to avoid injury of the delicate structures on which they terminate by the tortuousness of their course. e.g. the internal carotid artery this tortuousness is also seen in arteries which traverse parts subjected to frequent and violent changes of dimension in order to avoid rupture of the artery or obstruction to the motions of the part, e.g. the facial artery.

The arteries as a rule seek the most sheltered route they can obtain avoiding the surface when practicable and lying near the bones; when passing through muscular parts they seek the interstices between the muscles and traverse the substance of a muscle with the greatest reluctance and when an artery is forced to perforate a muscle the aperture through which it passes is surrounded by a tendinous sheath in order to avoid compression which would otherwise result when the muscle contracts. Another provision for the safety of an artery is found in the fact that arteries are isolated from the parts through which they pass by a fibrous investing membrane called the sheath of the artery thus tending to exclude the artery from participation in diseases of the parts which the sheath may be swelling and thus obstructing the parts which the artery is destined to supply with blood.

The names of arteries are derived as a rule from



the region which they occupy or from the parts which they are intended to supply. As a rule the name of an artery remains unaltered, irrespective of the size or number of branches it produces until it divides into two or more branches; the two exceptions to this will be found in the cases of the upper and lower extremities each of which is known under three different names in different parts of its course previous to its division. Another fact to be observed is that as a rule an artery will supply the part through which it is running and in consequence of this is constantly diminishing in size otherwise the size would remain the same to its termination for the walls of the artery do not absorb the blood which it is transmitting these being nourished by separate branches which ramify upon and called *vasa vasorum*.

The arteries are generally accompanied by the veins returning the blood to the heart from the parts which the arteries supply; the vein may be single and then usually bears the name of the artery with which it is found or there may be two veins with one artery and these are known as the *Satellite veins* of that artery or its *venae comites*; and the venous channel from any part is found to be about twice that of the arterial to it, and in consequence the venous current is much slower than the arterial but it gradually increases speed as it moves towards the heart owing to the fact the area of the veins constantly diminishes as they converge towards the right auricle of the heart into which all the venous blood is poured through two large veins the superior and inferior *venae cavae*.

326
297
— 74

regione fumi conus arborum

To distinguish it from it & left Pul-

The Pulmonary Artery - ²⁵⁷ applies only to human -

The pulmonary artery begins at the base of the right ventricle of the heart, the infundibulum, or conus arteriosus of that cavity leading up to it - Its origin is behind the left edge of the sternum, opposite the third left costal articulation, in front of and slightly above and to the right of the origin of the aorta - It is about two inches in length its direction being upward, backward and very slightly to the left - It lies in the fibrous pericardium which it pierces and immediately divides into the right and left pulmonary arteries - It and the ascending part of the arch of the aorta are contained in the same fold of serous pericardium -

It first lies on the front of the ascending part of the arch of the aorta but soon gets to the left of that vessel, more on account of the obliquity of the aorta than its own inclination to the left.

On each side of its origin is an appendix of the corresponding auricle and a coronary artery - Its bifurcation is immediately below the transverse part of the arch of the aorta, to which it is connected by a fibrous cord, a half inch long, the remains of the ductus arteriosus of foetal life - This cord is attached slightly to the left left of the point of bifurcation, so that it is easily connected with the commencement of the left pulmonary artery -

The two terminal branches of the pulmonary artery, the right and left pulmonary arteries, pass almost horizontally outward for about two inches each to the inner face of the corresponding lung where it bifurcates for distribution to the lung - The right is slightly larger

The Aorta

- 1st upward forward and to the right.
- 2nd Backward and to the left^a (convex up)
lumen. at left side of the lower border of
body of the 4th d - v.
- 3rd Descends beside the body of the 5th
dorsal vertebrae

behind the Pul. arch and desc. aorta

Commences at a line drawn across the
Sternum at the 3rd intercostal space.

The aorta is first in front of it is left lung then
above when behind

24^h

1^h
15

and somewhat longer than the left and passes behind the ascending part of the arch of the Aorta and the superior vena cava. The left passes in front of the descending part of the arch of the Aorta. Each forms an element of the root of the Lung being between the bronchus and the two pulmonary veins in front. The right is on a lower level than the bronchus, but the left is higher than the corresponding bronchus.

The Aorta.

The Aorta begins at the base of the left ventricle and terminates by bifurcating into the common or primitive iliac arteries on the front of the body of the fourth lumbar vertebra, usually a little to the left of the middle line. It is contained first in the thoracic cavity and then in the abdominal. It first passes upward, forward and to the right, on the fibrous pericardium for about two inches, passing the pericardium it arches backward and to the left, with the convexity upward and strikes the left side of the thoracic portion of the vertebral column, at the left side and lower border of the body of the fourth dorsal vertebra; it next descends beside the body of the fifth dorsal vertebra with a slight inclination to the right; from the lower border and left side of the body of the fifth dorsal vertebra it descends steadily inclining to the right to a point opposite the twelfth dorsal vertebra, usually on the middle line but frequently a little to the left where it passes from the thorax into the abdomen through the aortic opening of the diaphragm; thereafter its course is down the front of the lumbar vertebrae, generally inclining to the left to its termination.

Arter Arch - Begins -

at base of left vent of heart - pt. behind the
left edge of the sternum at 3rd inter
costal space - length 2 in -

Its course - up and to the right -

terminates where transverse lig - begins at edge of
is enclosed in pericardium - ^{sternum at the}
^{2nd cost. each}
 $\frac{1}{4}$ in behind the sternum

It - is 2nd to the right of Pul. artery
at first it is behind the " "

enveloped in serous pericardium -

It is divided for convenience of description into the arch of the aorta and the descending aorta. The arch of the aorta begins at the base of the left ventricle and extends to the left side and lower border of the body of the fifth dorsal vertebra and is subdivided into the ascending, transverse and descending parts. The descending aorta begins where the arch ends at the lower border and left side of the body of the fifth dorsal vertebra and includes the remainder of the artery, it is divided into the Thoracic and abdominal aorta, in accordance with the cavity in which it lies.

- The Ascending Part of the Arch of the Aorta -

The ascending part of the arch of the aorta, or as it is frequently called, the ascending aorta, begins at the base of the left ventricle of the heart, at a point behind the left edge of the sternum, at the front end of the third costal space, on a plane posterior to the origin of the subclavian artery and anterior to the left auriculo-ventricular opening. Its length is about two inches; its course is upward and to the right, slightly curving with the convexity to the right; it terminates in the transverse part of the arch where it pierces the pericardium, opposite the right edge of the sternum, behind the upper border of the second costal cartilage of the right side. Just above its origin it presents three bulging prominence when distended, which mark the position of the sinuses of Valvula. It lies in the fibrous pericardium, about one fourth of an inch behind the sternum and is contained in the same fold of serous pericardium with the pulmonary artery.

It first lies behind the origin of the pulmonary artery, but quickly gets to the right of that vessel, owing mostly

to its own inclination to the right, above the point where the pulmonary artery leaves its front it is separated from the sternum by the pericardium, some loose connective tissue and perhaps the remains of the thymus gland.

It has behind it the root of the right lung - To the right is first the right auricle and then the superior vena cava - To the left is the pulmonary artery.

- The Transverse Part of the Arch of the Aorta -

The transverse part of the arch of the aorta begins where the aorta pierces the pericardium behind the right edge of the sternum, on a level with the upper border of the second costal cartilage of the right side; its course is curved, with the convexity upward, the direction being to the left and backward; it strikes the left side and lower border of the body of the fourth dorsal vertebra, and terminates thereby becoming the descending part of the arch - not descending aorta -

The top of the arch is about an inch below the top of the sternum and from this aspect arise three large branches - the arteria innominata, the left common carotid and the left subclavian; resting on the arch in front of the origin of these three branches is the left vena innominata or great transverse vein of the neck.

Below this part is the bifurcation of the pulmonary artery to which it is connected by the remains of the ductus arteriosus.

The left bronchus lies below, and arching hooked around the artery here, towards the left, is a nerve the left inferior, or recurrent laryngeal, which arises from the left pneumogastric nerve directly on the front of this part of the aorta and after passing be-

The Phrenic nerve is also in front & is in front of the root of lung.

And the Pneumogastric behind the root of lung.

The Lower Dorsal lies on top & lying on the trans-
it of arch only, at numerous - acts as it passes up
& to the left to join the junction of Left Sub Clavian
and Left Int Jugular which form its source
and up on the Sub Clavian

Iron point - road of Capt. & Huber

between the

mouth ascends behind it. & the root of left lung.
This portion of the aorta is separated from the sternum by the left pleura and anterior border of the left lung and remains of the thymus gland; it is crossed from above downward on this aspect by two great nerves, the left pneumogastric and the left phrenic, the phrenic being directly in front of the pneumogastric and both being to the left of the middle line; the pneumogastric while lying on the front of the artery produces the left recurrent laryngeal.
Behind the transverse part of the arch, on the middle line is first the trachea and behind that the oesophagus; to the left of these are the thoracic duct and left recurrent laryngeal nerve - in the groove between the ^{trachea} ~~trachea~~ ^{oesophagus} ~~oesophagus~~

--The Descending Part of the Arch of the Aorta--
The descending part of the arch of the aorta begins where the transverse part terminates at the lower border and left side of the body of the fourth dorsal vertebra and passes downward inclining slightly to the right to terminate by becoming the thoracic portion of the descending aorta, at the lower border and left side of the body of the fifth dorsal vertebra.
It has, in front the root of the left lung; behind, the left side of the body of the fifth dorsal vertebra; to the left, the left pleura and lung; to the right, the oesophagus and thoracic duct.

--The Thoracic Aorta--
The thoracic portion of the descending aorta begins by being a continuation of the descending portion of the arch, at the left side and lower border of the body of the

Thoracic Aorta branching at 12th V.

Gray gives Pulmonary and left bronchus

Thoracic aorta

To left is

To right.

} Left. Sub. clavian
 } Innom. artz.
 } Left com. carotid

W3

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fifth dorsal vertebra and terminates by becoming the
 abdominal portion of the descending aorta, where the
 aorta enters the abdomen, at the aortic opening of the
 diaphragm, on the front of the body of the twelfth
 dorsal vertebra, usually on the middle line, but fre-
 quently slightly to the left. Its direction is downward
 and slightly, but slightly to the right; it is somewhat
 curved being concave in front, in accordance with the
 dorsal curve of the spinal column upon which it
 rests. It lies in the posterior mediastinum, behind
 the heart and lungs, covered in front and to the left by the
 left pleura and lung. Its great relations are the tho-
 racic duct and oesophagus, the thoracic duct is con-
 tinuously behind and slightly to the right. The oesoph-
 agus, on which are the two pneumogastric nerves, lies
 at first to the right, but as it descends gets gradually
 in front of the aorta and where it terminates by piercing
 the diaphragm opposite the tenth dorsal vertebra, it is
 not only in front but distinctly to the left of the aorta.
 To the right is the right, or great azygos vein, opening
 into which, about the sixth dorsal vertebra is the left
 azygos vein, which crosses behind the aorta.

The Abdominal Aorta.

The abdominal portion of the descending aorta begins
 by being a continuation of the thoracic portion, at the
 aortic opening of the diaphragm, on the front of the
 body of the twelfth dorsal vertebra, usually on the mid-
 dle line, but frequently slightly to the left and ter-
 minates by bifurcating into the common or primitive
 iliac arteries on the front of the body of the fourth lum-
 bar vertebra, usually slightly to the left of the middle

And in situation - at 100 1/2 in. in side with a
 a rest in beam - as shown - it - apex crack
 line shown in the -
 lila

Relations of the Abdominal cavity

- | | |
|------------------------|------------|
| 1 Stomach | } in front |
| 2 Semi-lunar ganglion | |
| 3 head of the Pancreas | |
| 4 Renal vein | |
| 5 Aorta - lilians | |
| 6 Aortic plexus | |

- | | |
|-------------------------|----------|
| 7 Caudal of lumbar duct | } Behind |
| 8 Nephrotic duct | |
| 9 Left lumbar duct | |
| | 95 |

- | | |
|---------------------|--------|
| 11 Left Symp. nerve | } Left |
| 12 - - - - - | |

- | | |
|----------------------|---------|
| 13 Right lumbar duct | } Right |
| 14 - - - - - | |
| 15 - - - - - | |
| 16 - - - - - | |



line, but frequently on it. Its direction is downward and generally slightly to the left, presenting a slight curve with its convexity forward, in conformity with the lumbar portion of the spine, upon which it lies.

It is markedly smaller where it terminates, owing to the large number and size of the branches which it produces.

It has in front, first, the stomach, then the two Semilunar ganglia of the sympathetic nerves, with their branches forming the solar plexus; next is the head of the pancreas, immediately below which are the left renal vein, the transverse portion of the duodenum and mesentery; below this the artery is covered in front and at the sides by the peritoneum and the aortic plexus of sympathetic nerves.

Behind its upper part is the commencement of the thoracic duct, the receptaculum chyli and it is separated from the lumbar vertebrae by the left lumbar vein. ~~On the left~~ ^{On the left} are the lumbar portion of the left sympathetic nerve and the left crus of the diaphragm. ^{Superiorly} ~~On the right~~ ^{On the right} are the right crus of the diaphragm, the inferior vena cava, and at its upper part the right renal artery and the thoracic duct.

The termination of the abdominal aorta corresponds to a point on the anterior abdominal wall a half inch below and to the left of the umbilicus and is about on a level with a line drawn between the highest points of the crests of the ilia.

Branches of the ascending Aorta.
The branches of the ascending aorta are two small arteries called coronary, left or anterior and right or posterior, which are distributed to the heart. These

1/2 W.B.

W.B.

The st. cor. artery arises from aorta just above the
 second lumbar valve is smaller than the aorta and arises
 between Pul. art. & st. aortic arch passing
 down to st. ventricle down to apex of heart in
 the post. inter. ventricle groove -

The left coronary artery - is larger than the right and arises
 from aorta higher than the right & between Pul. art. and
 left aortic arch and descends to apex of heart in
 ant. inter. ventricle groove giving off as it commences to
 go down (as does the right art.) a long curved branch
 which it anastomoses with the Septum -



Ven. Innom -

In front

Sternum - Sternohyoid & thyroïd and

Thyroid gland - and Cœliac trch. of pneumo-
 Left - Innominate Behind -

Trachea

To the Right is the Right pleura. & vena in-

nominate & Pneumogastrie.

in front { Sternohyoid,
 " " Thyroïd

Left on ant.
Right on Post.

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arise close to the origin of the aorta and run in the anterior and posterior interventricular furrows meeting at the apex of the heart and in the auriculo-ventricular grooves, thus forming two vascular zones around the heart one horizontal and one vertical - this is not enough.

Branches of the Arch of the Aorta.

The branches of the arch of the aorta, as before stated are three, the one to the right is the arteria innominata destined to supply the right side of the head and neck and right upper extremity, the middle branch is the left common carotid supplying the left side of the head and neck; the branch to the left being the left subclavian whose field of distribution is the left upper extremity.

Thus it is seen that the arteria innominata is destined to supply corresponding parts to the other two branches, it being in fact nothing more than the fusion of the common carotid and subclavian of the right side since after a short course it divides into these two.

- Arteria Innominata -

The arteria innominata is the first and doubly the largest branch of the arch of the aorta; ascending obliquely to the right for something else than 2 inches it terminates behind the right sterno-clavicular articulation, by dividing into the right common carotid and right subclavian arteries. Relations - In front of it is the sternum and in front of its origin is the left vena innominata. Behind it first has the trachea, but owing to its obliquity to the right it gets to the right side of the trachea - on its right is the right vena innominata - to the left of its origin is the left

So it is not ~~venous~~ and behind

between the heart and aorta. Pulmonary artery

Common Carotid

In front.

1. Integument & fascia² Plakasma
2. Sternomastoid. 6 or 8 Hyoid
3. " Hyoid 2 Dend. & Common
4. " Thyroid noni nerves.
5. Sternomastoid artery
6. Sup and middle thyroid veins
7. anterior jugular veins

Externally

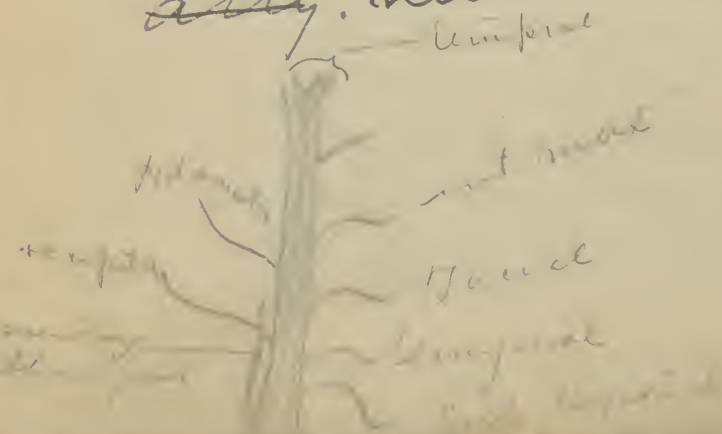
Internal jugular vein. Pneumogastric

Internally

Trachea, Thyroid Gland. Recurrent
laryngeal n. Inferior thyroida.
Larynx & Pharynx.

Behind

longus colli Rectus cap. ant. maj.
sympathetic nerve Inferior thyroid
artery & Recurrent laryngeal
artery. nerve



For common carotid of left side
See 510 page

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common carotid. - It possesses none but its terminal branches.

- Common Carotid. - Left & Right.

The common carotid artery of the right side springs from the bifurcation of the *arteria innominata* while the left common carotid is a branch of the arch of the aorta consequently the left is as long as the right and like *arteria innominata* added together and the relations of that portion which corresponds to the *arteria innominata* will be similar to the relations of that vessel though not identical; from behind the left sternoclavicular articulation onward to its termination a description of the left common carotid would be the same as that which will be given of the right.

The right common carotid beginning where the *arteria innominata* terminates behind the right sternoclavicular articulation, being one, of the two terminal branches of that artery, ascends the neck in front of the transverse processes of the cervical vertebrae as high as the fourth or in other words about on a line with the upper border of the thyroid cartilage, where it terminates by dividing into the external and internal carotid; in the female it usually terminates slightly below this level. - Relations - It lies on the anterior tubercles of the transverse processes of the cervical vertebrae to the fourth cervical vertebra having interposed between it and the transverse processes the prevertebral group of muscles - (and the sympathetic nerve) - It is contained in a strong fibrous sheath which also includes the internal jugular vein, separated from the artery by a partition, and the pneumogastric nerve; the internal jugular vein is external to the artery.

Pass in between it and the lul Carotid.

External In front. Carotid

1. Integument superficial fascia
2. Platyisma & deep fascia.
3. Hypoglossal nerve.
4. Lingual & facial veins.
5. Hyogastrie & Stylohyoid mus.
6. Parotid gland, with facial nerve & temp. pro. max vein in its substance

Behind

1. Superior Laryngeal nerve
2. Stylo glossus, 3 Stylo Pharyngeus.
4. Gloss Pharyngeal nerve
5. Parotid gland.

Internally

1. Hyoid bone 2 Pharynx
- 3 Superior Laryngeal nerve
- 4 Parotid gland
- 5 Ramus lower jaw.

and the pneumogastric nerve is between and behind the two descending, on the front of the upper portion of the sheath is a branch of the Hypoglossal nerve, called the descendens cerni; this sometimes pierces the sheath and descending within it. To the inner side of the artery and separating it from its fellow is, in the first part of its course the trachea and then the larynx, and since the latter is broader than the former the interval between the two arteries is greater above than below.

In front the artery has the following parts and in the order given - 1st Integument - 2^d Platysma myoides 3^d Sternocleidomastoid - 4th Sternohyoid - 5th Sternothyroid - 6th the ^{and belly} middle tendon of the omohyoid; The platysma myoides muscle is a universal covering for the artery; the sternocleidomastoid muscle covers it from its commencement to within a short distance of its termination; the point where it draws off to the outer side of the artery corresponds to the part of the artery crossed by the omohyoid and this occurs about the middle of the neck on a level with the cricoid cartilage and here the artery enters the superior carotid triangle (vide muscles of neck Vol. IV. p. 1) - at its apex, emerging at the same time from beneath the middle tendon of the ^{ant. bell. of Sternohyoid} omohyoid, and the sternocleidomastoid; it ascends to about the middle of the superior carotid triangle before bifurcating and all that portion which lies in this triangle is superficial being covered only by the integument and platysma myoides muscle. The sternohyoid and sternothyroid muscles cover only a small extent (some two inches) of the lower part of the artery passing to the inner side. At its origin the artery has in front integument, pla-

The one hyair comes carter at line
of crocod cartage.

relations of Ext Carabid

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sternum mizoides, the origin of the sterno-cleido-mastoid, the sterno-clavicular articulation of the right side, and the origins of the sterno-hyoid and sterno-thyroid muscles.

The course of the artery can be thus indicated; draw a transverse line from the upper border of the thyroid cartilage to the anterior edge of the sterno-cleido-mastoid and a perpendicular line from the sterno-clavicular articulation to the point where the transverse line intersects the sterno-cleido-mastoid and the artery will lie behind the perpendicular one. The artery is preferably tied, where it is crossed by the middle ^{part} tendon of the omohyoid muscle and on the front of the sheath at this point will be found a nervous anastomosis of the descendens nervi and nervous filaments from the cervical plexus, and this is called the arch of Scarpa.

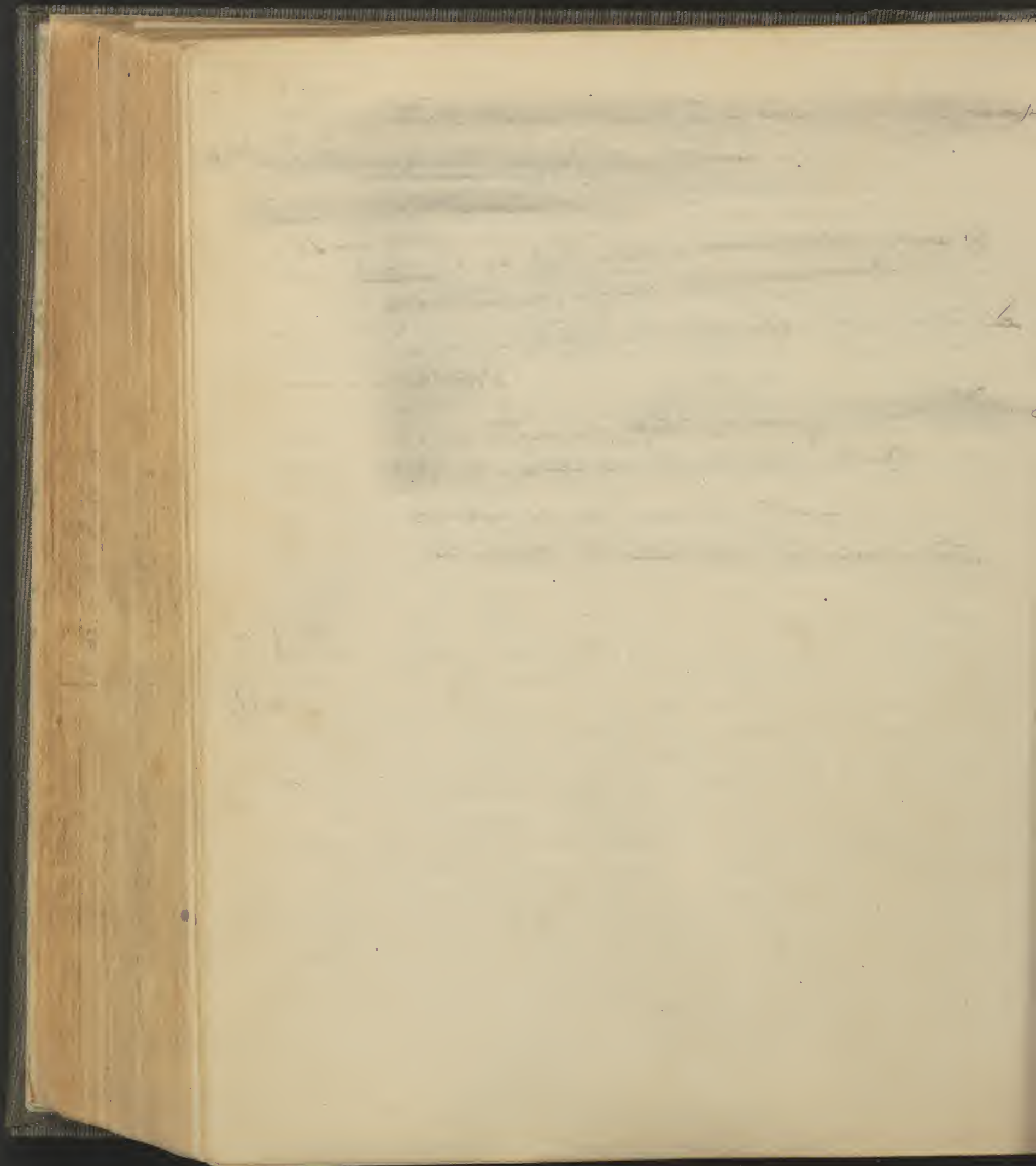
The common carotid is divided by surgeons into two portions, the first extends from its origin to the crossing of the omohyoid muscle, the second from this point to its termination; some divide it into three portions saying the first extends to the omohyoid, the second is that part covered by the middle tendon of the omohyoid and the third is that portion lying in the superior carotid triangle.

- External Carotid -

The external carotid artery, one of the two terminal branches of the common carotid, begins where that artery forks about on a level with the upper border of the thyroid cartilage and continuing the direction of the common carotid ^{vertical} beneath the posterior belly of the digastric and stylo-hyoid muscle, enters the substance

a line drawn from condyle of
lower jaw to its origin.

of the parotid gland and terminates in that gland behind the neck of the condyle of the lower jaw by dividing into two branches, the temporal artery which continues the upward course of the external carotid to mount over the zygoma and be distributed on its branches to the side of the head and the internal maxillary which passes inward behind the neck of the lower jaw. The first portion of the external carotid lies in the superior carotid triangle, its length varying as the common carotid divides on a level with or above or below the upper border of the thyroid cartilage, for it extends from the bifurcation of the common carotid to the posterior belly of the digastric and stylo-hyoid muscles; it is covered by the integument and platysma myoides muscle and is crossed in front by the Hypoglossal or 12th nerve; at its commencement the internal carotid artery lies to its outer side by the time the external carotid has reached the posterior belly of the digastric and stylo-hyoid muscles the internal carotid has become posterior to it - The second portion of the external carotid is that which is crossed by the posterior belly of the digastric and the stylo-hyoid muscles; its coverings are integument, platysma myoides and posterior belly of the digastric and the stylo-hyoid muscles - The third and last portion of the external carotid extends from the posterior belly of the digastric and the stylo-hyoid muscles to the termination of the artery behind the neck of the condyle of the lower jaw - It lies embedded in the parotid gland and is crossed superficially near its termination by the facial nerve - The first portion of the external carotid is the most superficial, the second portion is the shortest and the third por-



is the longest and deepest.

Branches of the External Carotid.

In studying the branches of the external carotid, it should be borne in mind that since the common carotid produces no branch until it terminates and hence the parts in its course have to be supplied by other vessels: the external carotid performs some of this labor.

The external carotid besides its terminal branches gives origin to six single branches & get to the parotid gland. The three first described arise from the anterior aspect of the artery near its origin and in the order given from below up. The next two arise from the back of the artery and higher up.

(1) Superior Thyroid.

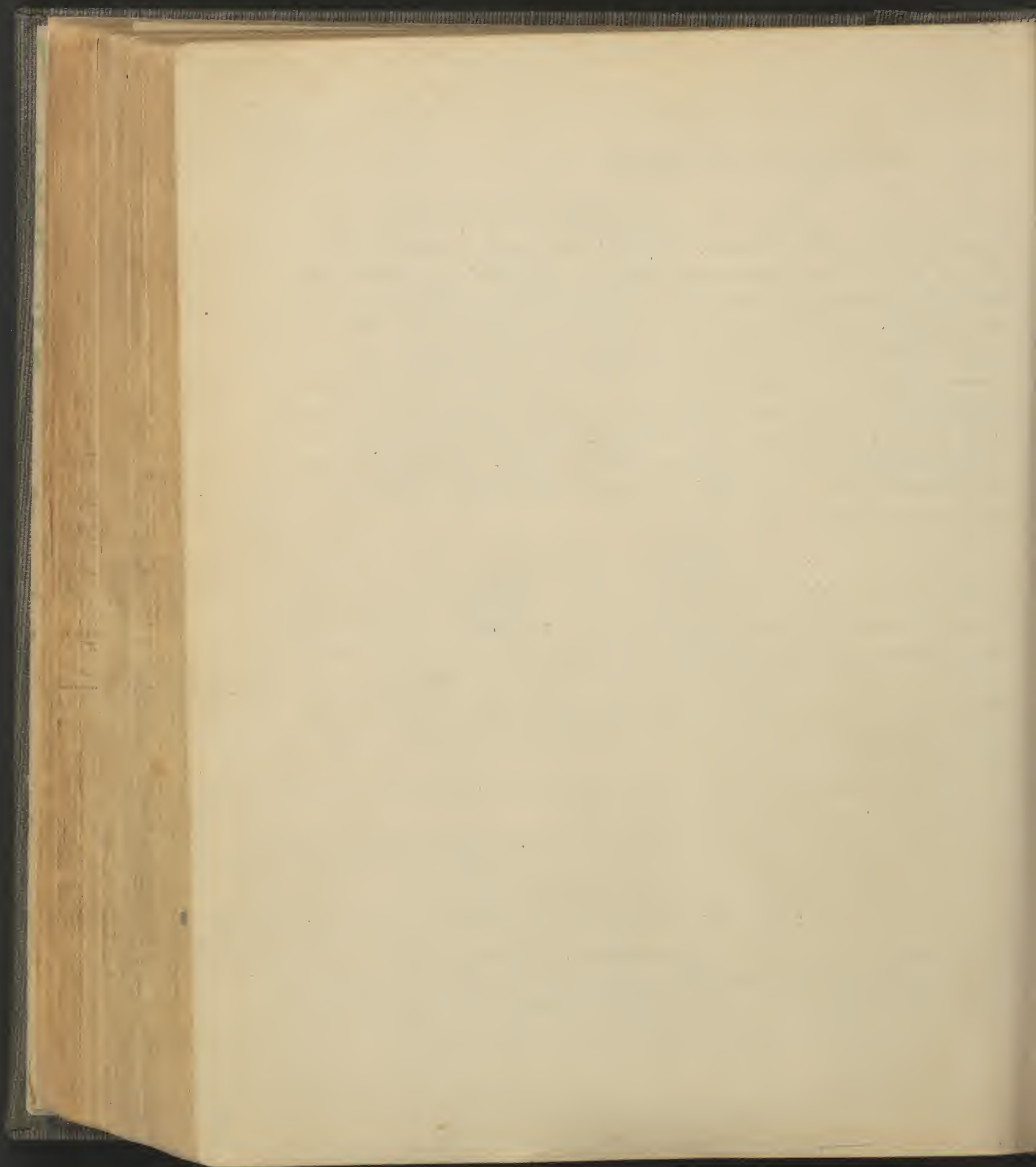
The superior thyroid forms a curve first passing upward and inward and then downward and inward and coursing beneath the depressor muscles of the hyoid bone, viz, omohyoid, sternohyoid and sternothyroid successively, reaches the upper part of the thyroid gland to which it is distributed. It gives off four branches as follow.

(1) Hyoid - which passes forward just below the hyoid bone to be distributed to muscles.

(2) Superior Laryngeal - which passing forward on to the thyro-hyoidean membrane pierces it to be distributed to the mucous membrane of the larynx.

(3) Inferior Laryngeal - which passes forward across the crico-thyroidean membrane and gives off branches which pierce to reach the mucous membrane.

(4) Muscular Branches - which pass downward and



outward and across the common carotid artery.

Stero Mastoid.

II. Lingual.

The lingual artery is divided into four portions: - 1st it ascends obliquely upward over the extremity of the hyoid bone covered only by platysma and skin: 2^d it passes forward along and above the hyoid bone covered by the hyo-glossus muscle - 3^d it ascends to the under aspect of the tongue and 4th it runs forward on the under aspect of the tongue to its apex (under the name of ramus) - The first two portions lie on the middle constrictor of the pharynx -

Its branches are three -

- (1) Hyoid - which runs upward along the upper border of the hyoid to be distributed to muscles -
- (2) Dorsalis Lingual - which ascends to the dorsum of the tongue (along the posterior border of the hyo-glossus muscle -)
- (3) Sub-lingual - which runs forward to sub-lingual gland and muscles

III. Facial.

The facial artery arises just above the hyoid bone and is divided into two portions, one while it is on the neck the other after it reaches the face; the first portion ascends forward through the submaxillary gland to run over the body of the lower jaw just at the anterior or inferior angle of the masseter muscle and about $1\frac{1}{2}$ inches in front of the angle of the jaw - (At its origin superficial - being covered only by skin and platysma, it soon enters the Sub-Maxillary gland and is besides beneath the posterior belly of the Digastric and

Supplies all the Seta flowers
Slyke Company

stelo-hyoid muscles; when it leaves the gland and mounts on the jaw it is again superficial being covered only by the integument and platysma and its pulsations can here be felt.) The second portion of the artery has a tortuous course over the face upward and inward towards the angle of the mouth along beside the nose to terminate at the inner angle of the eye (as the angular artery). Its branches are those below the jaw or of the first portion, five and those on the face or of the second portion, five -

(1) ~~Inferior palatine~~ - which ascends to the soft palate.

(2) ~~Tonsillar~~ - which ascends to the tonsil.

(3) Sub-maxillary - which are from 3-5 in number and distributed to the sub-maxillary gland.

(4) Submental which runs forward beneath the lower jaw.

(5) Muscular - which are branches to neighboring muscles - The five branches of the second portion are as follows -

1. Muscular or Buccal - which are branches to adjacent muscles.

(2) Inferior Labial - which runs forward beneath the lower lip - *varies much with sub-max.*

(3) Inferior coronary - which skirts the edge of the lower lip.

(4) Superior coronary - which skirts the edge of the upper lip giving off a branch to the septum of the nose, *arteria septi.*

(5) Lateralis Nasi - which is distributed to the side of the nose.

IV. Occipital - ✕

The occipital branch of the external carotid passes

Crosses Int jugular vein and int carotid Arty -
" Pneumogastric sublingual accessory Nerve.

Is crossed by Sty Hyoid
Dysph. Port belly -

Relations of the Hyoglossus

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upward and backward to the occipital groove of the temporal bone beneath the muscles attached to the mastoid process, thence running on the posterior aspect of the occipital bone and piercing some of the deep muscles of the back becomes superficial and is distributed to the back of the head.

Its branches are two-

- (1) Stermo-mastoid - which, sometimes arising directly from the external carotid, descends to muscles and glands.
- (2) Princeps cervicis - which passes down the neck lying deep (and is important as establishing collateral circulation after ligation of the common carotid.)

- V. Posterior Auricular -

The posterior auricular passes upward and backward behind the ear and is distributed by an anterior branch to the auricle and by a posterior branch to the back of the head. It produces one branch the Stylo-mastoid, which enters the stylo-mastoid foramen to be distributed to the ear.

VI. Parotidian Branches -

The parotidian branches from four to five in number are distributed to the parotid gland as the external carotid is crossing through it.

- VII. Ascending Pharyngeal -

The ascending pharyngeal branch springs from the external carotid just at its origin and passes up beside the pharynx to the base of the skull where it divides into a tonsillar branch to enter

1 1/2 inches above the Zygoma

Brain chns
Transverse fissure
Orbitals
Inferior double transverse

the cavity of the cranium (through the jugular foramen) and a pharyngeal branch to adjacent parts.

-The Temporal Artery-



The temporal artery, one of the two terminal branches of the external carotid, begins where the external carotid forks in the parotid gland behind the neck of the condyle of the lower jaw, and ascending emerges from the parotid gland, mounts over the zygoma and divides about $1\frac{1}{2}$ in above the zygoma and lying on the temporal fascia into an anterior temporal which passes upward and forward and a posterior temporal which passes upward and backward; these two being called the superficial temporal branches since as will appear hereafter there are other and deeper temporal branches.

The branches of the temporal artery besides its terminal ones are four-

(1) Transverse Facial which arises below the zygoma and passes transversely forward on the masseter muscle and parallel with Stenon's duct.

(2) Anterior Auricular - to the front of the auricle.

(3) Orbital - which runs forward to the outer angle of the eye.

(4) Middle Temporal - which plunges into the substance of the temporal muscle where it is distributed and its name is derived from its position between the two superficial temporal branches and the deep temporal branches which are the off-spring of another artery.

The Internal Map.

1st Portion

- ~~can mention it.~~ (1) Tympanic
(2) Meningea Media.
(3) " " " " Parva.
(4) Inferior Dental.

2nd Portion

- (1) Superior Dental
(2) Infra Orbital
(3) Spheno Palatine
(4) Descending " " "
(5) Ptergo " " "
(6) Vidian " " "
(7) Inf. Dental.

The anterior nerve is above and cut
the posterior (92)
Crosses the inf. dental nerve.

Int. Pt. goil mus. is int. to 1st part

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- The Internal Maxillary -

The internal maxillary artery is the larger of the two terminal branches of the external carotid.

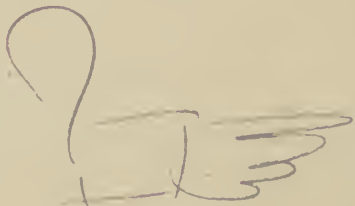
The course of the artery is divisible into three portions - The first portion passes inward forward and upward behind the ramus of the inferior maxilla; between it and the internal ^{just above it is an arterial branch} lateral ligament, the second portion ascends forward be-

tween the external pterygoid muscle within and the temporal and masseter muscles without. The

third portion disappears into the sphenomaxillary foramen. Its branches are sixteen in number, as follows.

From the first portion arise four:

- (1) Tympanic - which enters the tympanum through the foramen of Eustachius - not constant. ^{chord and 0.92}
 - (2) Meningea Media - which ascends to enter the cavity of the cranium through the foramen spinosum = ^{artery to dura mater by art. + post. cereb. a.}
 - (3) Meningea Parva - which enters the cavity of the cranium through the foramen ovale.
 - (4) Inferior Dental which descends to enter the dental foramen of the inferior maxilla and run forward on the bone giving a branch to every fang of the lower jaw; just before entering the dental foramen it gives off a branch called mylo-hyoidean and when it reaches the mental foramen it divides, sending a branch, called Mentalis, through the mental foramen, and by another called incisive continuing its course forward in the bone.
- From the second portion of the artery arise six branches, which are collectively known as muscular

Kaso Palaknee hand ? 

being distributed to the five muscles of mastication: each muscle receives one branch except the temporal which gets two and those lying beneath the muscle on the bone are called the deep temporal arteries. From the third portion of the artery arise six branches -

- (1) Superior Dental - which descends upon the tuberosity of the superior maxilla and sends its branches through small foramina in the bone to supply the teeth of the upper jaw.
- (2) Infra-orbital - which runs forward along the canal in the floor of the orbit, sending branches downward to the front teeth of the upper jaw, and emerges through the infra-orbital foramen to supply adjacent parts on the face. Branches run through the bone.
- (3) Spheno-palatine, which enters the nose through the sphenopalatine foramen and divides into two branches, one being distributed to the septum, the other to the mucous membrane of the outer wall and nostril.
- (4) Descending Palatine - which descends along the posterior palatine canal to emerge in the palate through the posterior palatine foramen and send a branch forward in the groove seen on the side of the hard palate (called the anterior palatine branch) which reaches the floor of the nose through the anterior palatine foramen.
- (5) Pterygo-palatine - which runs backwards in the pterygo-palatine canal to the pharynx, Eustachian tube and neighbouring parts.
- (6) Vidian - which passes backward along the pterygoid canal and like the preceding is distributed.

Vidian canal

The Right Sub Clavian Artery

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outer border of first Rib-
lumination of sub clavian } 3

Right, Subclavian Artery

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ited to the mucous membrane of the pharynx and to the Eustachian tube.

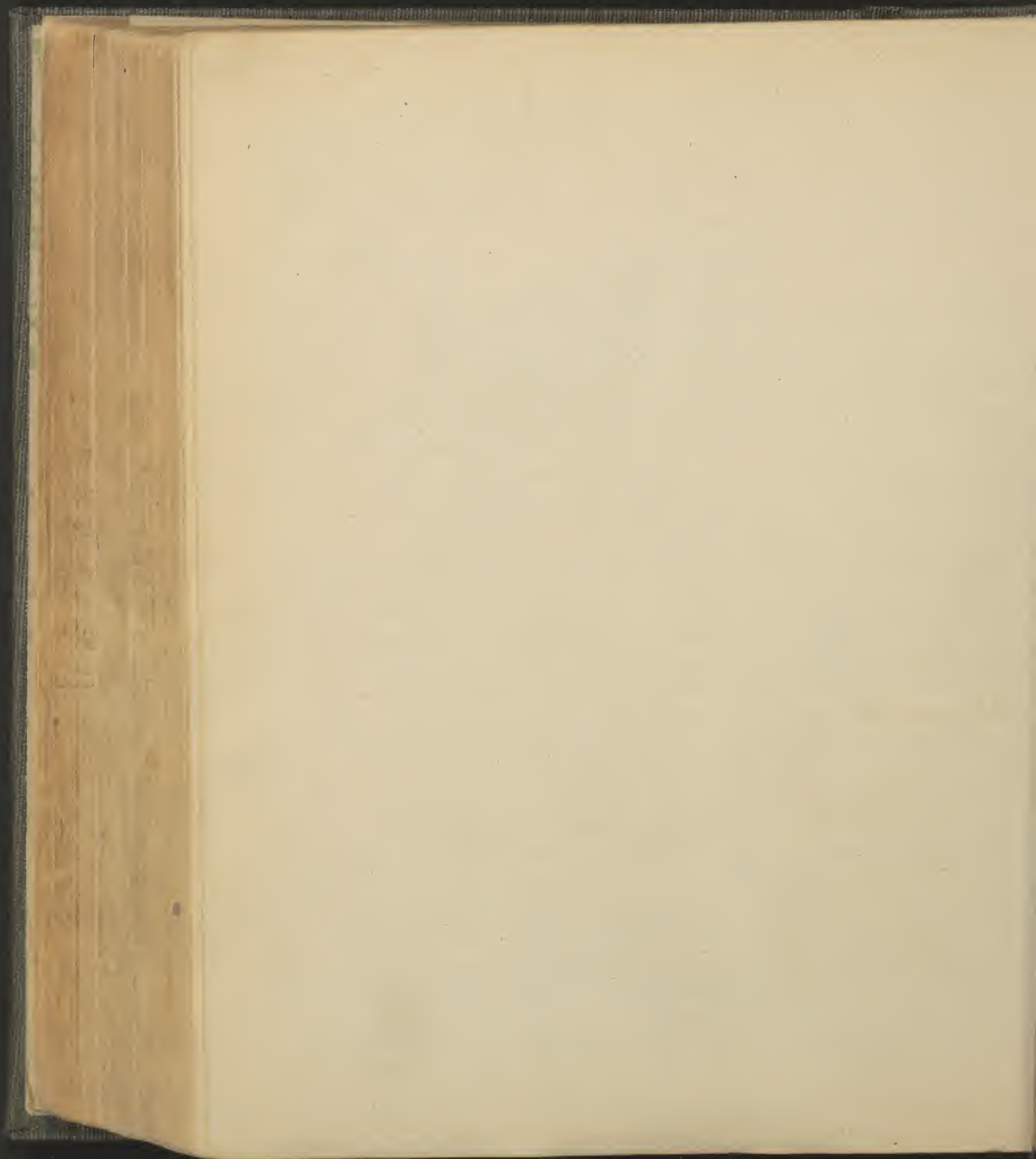
- The Right Subclavian Artery. ✓

The subclavian artery of the right side is one of the two terminal branches of the innominate artery, and is the first subdivision of the artery of the upper extremity, which although it does not divide until it reaches the front of the elbow joint is known previous to its division under three names, subclavian, axillary and brachial.

The right subclavian begins where the arteria innominata forks behind the right sternoclavicular articulation and arches outward forming a bow whose convexity is upward, first passing upward and outward and then outward to the top of the bow, and then downward and outward to pass obliquely behind the clavicle and to terminate at the lower border of the clavicle, by assuming the name of axillary.

The top of the arch lies just behind the scalenus anticus muscle and this relation warrants the division of the artery into three portions; the first portion extends from the origin of the artery upward and outward to the inner edge of the scalenus anticus muscle; the second portion passes outward and is restricted to that part of the artery which lies behind the scalenus anticus muscle; the third portion passes downward and outward to terminate in the axillary at the lower border of the clavicle and in fact may be said itself to consist of two parts, viz, that part

outer border of st. Rib



which lies above the clavicle in the subclavian triangle and is superficial, and that part which lies behind the clavicle and is consequently deep. The third portion disappears under the clavicle, about the middle of the bone but the outward obliquity of the artery is such that it emerges below about the junction of the middle with the outer third of the bone.

- Relations -

Covering the artery universally are the integument and the platysma myoides muscle: in front of the origin of the artery of course are the same structures that lie in front of the origin of the right common carotid and of the termination of the arteria innominata the parent of the two: viz, integument, platysma myoides, sternocleidomastoid, sternoclavicular articulation, sternohyoid, and sternothyroid but since the subclavian has a direction more or less outward it emerges from beneath the muscles arising at the sternoclavicular articulation much sooner than the common carotid does since its direction is upward more or less approximating to that of the muscles. Lying to the inner side of the commencement of the subclavian is the right common carotid and since the internal jugular vein descends to the outer side of the latter it must cross the subclavian artery and it does cross in front of its first portion uniting just there with the subclavian vein, which has run inward behind the clavicle, to form the right vena innominata and as

Relations of 1st Portion of Sub. Clavian

- 1 Glavicular artery of Stenamastoid & Pharynx
- 2 Steno hyoid & Steno Thyroid
- 3 Internal jugular vein & ~~Pharynx~~
- 4 Pneumogastric cardiac Phrenic nerve

Beneath

Pleura

Behind

- 1 Recurrent laryngeal nerve
- 2 Sympathetic 3 Laryngeal collar
- 4 Transverse process 7th cervical vert

the pneumogastric nerve also lies to the outer side of the common carotid it likewise crosses the front of the first portion of the subclavian. Since the subclavian artery lies at the root of the neck and since the cavity of the thorax lined by its pleura extends some $1\frac{1}{2}$ inches into the root of the neck, the pleura will be found in relation with the under aspect of the artery until the two are separated during the course of the third portion of the artery by the intervention of the first rib upon which the last portion of the subclavian rests.

A point of interest connected with the coverings of the subclavian artery is the extent of the artery which lies beneath the sterno-cleido-mastoid; this muscle usually covers both the first and second portions but as the extent of its clavicular origin is variable as its relation to the artery beneath it; for sometimes it scarcely covers the front two portions and then again it may cover a part of the third portion or even reaching to the anterior edge of the trapezius the whole of it.

Having studied the subclavian as a whole we will now take each of its parts and study it separately in its relations.

- First Portion -

The first portion of the right subclavian is the upward and outward portion, beginning where the arteria innominata forks behind the right sterno-clavicular articulation it extends to the inner edge of the clavicular articular muscle. It is covered throughout by the integument by the platysma

2nd Portion Sub Clavian Gully
Injunct.

- 1 Scalenus Anterior
- 2 Phrenic Nerve. (perforated)
- 3

Above

Brachial Plexus

Below & Behind

Clavus

Behind

Plexus

Not like scalenus

myoides and sterno-cleido-mastoid muscles, at its commencement by the right sterno-clavicular articulation by the sterno-hyoid and sterno-thyroid muscles - crossing the front are the pneumogastric and generally the phrenic nerves (though the latter sometimes crosses the second portion on the scalenus anticus muscle), and the internal jugular vein which just as it has crossed the front of the artery unites with the subclavian vein to form the right vena innominata.

To the inner side of its commencement is the right common carotid artery.

Beneath, the artery rests on the plexus and is in relation as before stated with the subclavian vein, which forms, so to speak the string to the subclavian bow, for being in contact with the inner aspect of the termination of the 3^d portion it runs transversely inward behind the clavicle while the artery arches a full $\frac{1}{2}$ in above the clavicle and the two are in relation again only at the origin of the artery.

- Second Portion -

The second portion of the subclavian is the outward portion, the top of the bow, that portion which lies behind the scalenus anticus muscle and coextensive with the breadth of that muscle.

In front are the integument, the platysma myoides, the sterno-cleido-mastoid and the scalenus anticus.

Behind and above it and separating it from the scalenus posticus muscle is the brachial plexus

The subclavian vein is in front of Scl. anterior mus.

Relations of 3rd portion Sub clavi-

In front

Cervical fascia
External jugular, sub scapular
and transverse cervical veins
Descending branch of cervical
plexus. Nerve to Sub clavus
Sub Clavius mus. Supra
scapular artery & clavicle

Above

Brachial Plexus & Axillary Nerve
artery & vein to axilla

Below

1st Rib

Behind

Scalenus - medius

of nerves-

Below, the artery rests on the pleura.
The subclavian vein is some distance below this portion behind the clavicle and in front of the scalenus anticus muscle-

- Third Portion -

The third portion of the subclavian is the downward and outward portion extending from the outer edge of the scalenus anticus muscle to the lower border of the ^{1st} rib and lying first between the two scaleni muscles and then between the clavicle and first rib.

It is covered by the integument and platysma myoides and possibly partially or even totally by a redundant origin of the sterno-cleido mastoid; besides these muscles is of course the clavicle - crossing the front of this portion are two vessels; one an artery, the supra-scapular, a branch of the subclavian itself, which passes outward just beneath the upper border of the clavicle; the other is a vein the external jugular, which descends the neck - To the outer side is the brachial plexus - To the inner side is the subclavian vein which however is in contact only for a short distance from the termination of the artery.

This portion rests on the pleura at its very commencement and then on the first rib which separates it from the pleura -

For subclavian artery is preferably ligated in its 3^d portion where it lies on the 1st rib the clavicle being moved off it by forcibly depressing the shoulder.

This point is selected for the three following reasons -
 1st It is most accessible - 2^d It is most remote from
 the branches of the artery for these as will be seen
 arise from the 1st & 2^d portions -
 3^d It is separated from contact with the pleura
 by the 1st rib.

- Branches -

The branches of the subclavian artery are seven in
 number I. Vertebral - II. Inferior Thyroid - III. Supra-
 scapular - IV. Transversa colli - V. Internal Mam-
 mary - VI. Superior Intercostal - VII. Cervicalis
 Profunda -

These seven branches usually arise by four trunks
 these being the vertebral, the thyroid axis, the in-
 ternal mammary and the common trunk of the
 superior intercostal and the cervicalis profunda.
 It should be stated, the word axis in arterial
 anatomy means a short trunk which quickly di-
 vides into at least three branches.

The branches which the thyroid axis produces are
 usually those above stated, viz - Inferior thyroid,
 supra-scapular and transversa colli though
 these vary the inferior thyroid being the most
 constant of its progeny gives name to the axis -

- I. Vertebral -

The vertebral artery, the first and largest branch
 of the subclavian arises from the ^{1st} posterior as-
 pect of the artery and ascends through the
 foramina in the transverse processes of the cervi-
 cal vertebrae (except the seventh) and winding

Branches of Vertebral. artery.
Cervical Spinal.
Muscular
Post. Meningeal
Ant. Spinal.
Post. Spinal.
Inf. Cerebella

Branches of Basilar.
Transverse.
Ant. Cerebellum
Post. " " " "
Sup. Cerebella.

backward around the superior articular process of the atlas it enters the cavity of the cranium at the high the foramen magnum and unites with the lower border of the Pons Varolii with its fellow of the opposite side to form a single trunk called the Basilar artery which passes forward to the anterior border of the Pons and divides there into four terminal branches two to each side.

The branches of the vertebral artery are as follows.

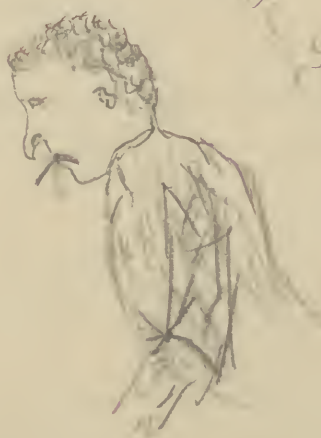
- (1) Lateral Spinal - which are given off as the artery ascends the neck and enter the intervertebral foramina.
- (2) - Muscular - which are unimportant branches to cervical muscles.
- (3) - Posterior Meningeal - which is also an unimportant branch to the Dura Mater of the cranium.
- (4) Anterior Spinal - which unites with its fellow of opposite side to form a common trunk which descends from the cranium along the front of the spinal cord.
- (5) Posterior Spinal - which winds around the medulla oblongata to descend on the posterior aspect of the spinal cord.
- (6) Inferior Cerebellar - which winds around the medulla oblongata to reach the under surface of the cerebellum.

The branches of the Basilar Artery are as follows -

- (1) Transverse - which are numerous branches given off to each side to the Pons Varolii.
- (2) Anterior Cerebellar - which run along the anterior border of the cerebellum and may be given as one of the transverse.

Don't fight the
Currents Ascendents

mm
mm



The two terminal branches to each side are:

- (3) Superior Cerebellar - which is distributed to the upper surface of the cerebellum;
- (4) Posterior Cerebral - which is distributed to the posterior lobes of the cerebrum - (Just as the basilar divides it gives off numerous small branches which enter the minute foramina constituting the locus perforatus of the base of the brain).

- II - Inferior Thyroid -

The inferior thyroid is the most constant branch of the thyroïd axis, which arises from the upper aspect of the subclavian near the termination of its first portion -

The inferior thyroid artery first ascends and then turns inward behind the sheath of the common carotid artery to reach the thyroid gland -

Its branches are some important twigs to the larynx trachea and oesophagus and a large branch called the Cervicalis Ascendens - which arising from the inferior thyroid just as it makes its inward turn ascends the neck on the anterior tubercle of the transverse processes to be distributed to muscles and glands -

III - Supra-Scapular -

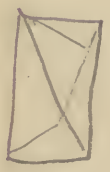
The supra-scapular artery, arising usually from the thyroïd axis, first descends and then turns outward, behind the clavicle and across the 3^d portion of the subclavian, to the dorsum of the scapula ("over the transverse ligament of the scapula") to be distributed to muscles there - and passing onward behind the spine of the scapula to supply spaces for all to communicate with the axillary space.

4983
 240
 225
 5165
 96

17.
 17
 232
 24
 252
 5752
 73
 76
 1096
 41
 49
 46
 (91)



Two branches



near the main border of the
 section antlers

James Wilson
184

II. Transversa Colli-

The transversa colli artery, arising usually as a branch of the thyroid axis, passes outward across the side of the neck to the anterior edge of the trapezius muscle, where it divides into two branches:

- (1) Cervicalis Superficialis - which ascends beneath the trapezius and
- (2) Posterior Scapular - which passes to the scapula and descends along its base.

-V Internal Mammary-

The internal mammary artery arises from the under aspect of the subclavian and descending behind the costal cartilages about $\frac{1}{2}$ of an inch from the edge of the sternum, to the diaphragm where it divides into its two terminal branches superior and musculo-phrenic.

Its branches are as follows:

- (1) Anterior Intercostal - which are given off to the intercostal spaces over which the internal mammary passes and passing outward soon divides into two branches to course along the adjacent borders of the ribs; sometimes these branches spring separately from the artery.
- (2) Perforating - which generally six in number, pass forward to the front of the thorax and run outward, being chiefly distributed to the mammary gland on the female.
- (3) Mediastinal - which are unimportant branches to the anterior mediastinum.
- (4) Pericardiac - which are also unimportant branches to the pericardium.
- (5) Corae Arter. Phrenici - which is a small branch

terminal branches—



to accompany the phrenic nerve-

- (6) *Musculo-phrenic* - which is one of the terminal branches of the artery and passes outward and downward to the last intercostal space, behind the cartilages of the false ribs -
- (7) *Superior Epigastric* - which is the other terminal branch, entering the sheath of the rectus abdominis muscle. It there anastomoses with the inferior epigastric, a branch which ascends from the external iliac artery - This is the largest (?) arterial anastomosis in the body and taken in connection with the number of branches produced by the internal mammary renders that artery one of the most remarkable in the body -

-II. Superior Intercostal-

The superior intercostal usually springs by a common trunk with the cervicalis profunda from the second portion of the sub-clavian artery. It descends on front of the neck of the first rib and gives off branches to the first two intercostal spaces -

III. Cervicalis Profunda -

The cervicalis profunda artery passes backward between the transverse process of the 7th cervical vertebra and 1st rib or transverse process of the 1st dorsal vertebra and ascends the neck to anastomose with the princeps cervicis branch of the occipital artery, thus establishing an important collateral circulation on ligation of the common carotid artery -

28.

opposite to front fold is with

traces of such Scapularis.

(1) at top (2) sub-top

(1) at top (2) sub-top

more distinct, early - 18.

more distinct, early - 18.

- Axillary Artery -

The axillary artery is the second subdivision of the artery of the upper extremity: beginning where the subclavian vessel, it passes downward and outward over upper lateral aspect of the chest, the first four ribs and down the inner aspect of the arm to terminate at the lower edge of the tendon of the latissimus dorsi and Teres major muscle by becoming the brachial; the direction of that portion of the artery on the arm varies of course with the movements of the limb.

- Relations -

It is covered throughout by the pectoralis major muscle and beneath this is the pectoralis minor muscle, which covers a portion of the artery; this relation of the pectoralis minor warrants the subdivision of the artery into three portions, the first extends from its commencement to the upper edge of the pectoralis minor, being contained in the triangular space between the clavicle and pectoralis minor (See Vol. II. p. 43) and covered by the pectoralis major; the second portion lies beneath the pectoralis minor and is covered by it and the pectoralis major; the third portion extends from the lower edge of the pectoralis minor to the termination of the artery and is covered by the pectoralis major. As the artery is crossing from the chest to the arm it lies on the tendon of the subscapularis muscle and as soon as it strikes the inner side of the arm it lies along the inner side of the coraco-brachialis muscle, which relation it

deep from a corner the un-utility of
+ forming a point

Rock Mag.
East of the point
Sub division
On East of the point
Across the point

Rock Point



On the point

1st white - cut of the point
2nd white - cut of the point
3rd white - cut of the point

2nd Point -
O.R.

3rd Point -

see note -
also has white - brown + black mag. below -

maintains to its termination.

Besides these relations to muscles the artery has important ones to cords as follows.

The axillary vein is continuous to its inner front aspect.

The venous plexus of nerves is first to its outer side and then to its outer and posterior and inner aspect and finally the cords which lie to its sides each produce a branch which unites with its fellow in front of the artery to form the median nerve, thus surrounding the artery. The median nerve descends along the outer side of the artery to the termination of the latter.

- Branches of the Axillary -

The branches of the axillary artery are seven - I.

Short Thoracic; II. Acromial Thoracic; III. Thoracic Aclavicular; IV. Long Thoracic; V. Anterior circumflex; VI. Posterior Circumflex; VII. Subscapulari - The two first arise from the 1st portion of the axillary, the next two from the 2^d portion and the other three from the 3^d portion -

I. Short Thoracic -

The short (superior) thoracic artery arises from the first portion of the axillary and passes inward on the pectoralis minor muscle to be distributed to the pectoral muscles and the mammary gland.

- II Acromial Thoracic

The acromial thoracic artery arises from the first portion of the axillary by a short trunk which

Heavy fog & rain of sunset.

divides into three branches as follows:

- (1) Pectoral, which supplies the pectoral muscles.
- (2) Acromial, which gives name to its parent though the smallest of its progeny, passing outward it is distributed to the parts around the acromion process.
- (3) Descending - which descends in the inter-space between the deltoid and pectoralis major.

III. Thoracica Alaris -

The thoracica alaris artery is a small branch given off from the second portion of the axillary to structures in the axilla.

IV. Long Thoracic -

The long thoracic artery arises from the second portion of the axillary and descends supplying the chest-wall.

V. Anterior Circumflex -

The anterior circumflex artery arising from the third portion of the axillary passes outward on the front of the humerus just below the shoulder-joint to which it is distributed, anastomosing externally with the following.

VI. Posterior Circumflex -

The posterior circumflex artery springs from the third portion of the axillary running outward on the back of the humerus is distributed to the shoulder joint and anastomoses on the outer side of the humerus with the anterior circumflex, the two

Platanus Schomb.

Incipis

Mus. Spinal Nerve

Sup profunda Arty.

Cervic. Branch - its course

Brach. Artery -

arteries thus forming a vascular zone around the upper extremity of the humerus, the posterior being larger than the anterior.

- VII - Subscapular -

The subscapular artery arises from the third portion of the axillary and descends along the lower border of the subscapularis muscle ^{to the} ~~to be~~ distributed to adjacent parts. About an inch and a half from its origin it gives off a branch the Dorsalis Scapulae which anastomoses upon the dorsum of the scapula to be there distributed.

- Brachial Artery - high down arm -

The brachial is the third subdivision of the artery of the upper extremity, being a continuation of the axillary, it commences where that artery ceases at the lower border of the tendon of the Latissimus dorsi and runs major muscles and passing downward and outward terminates about $\frac{1}{2}$ an inch ("a finger's breadth") below the middle of the front of the elbow joint by dividing into the radial and ulnar arteries; being first to the inner side of the arm and then on its front, so that in order to check the circulation in it by pressure the artery in the first part of its course must be pressed outward against the humerus and on all the lower part directly backward.

- Relations -

The muscular relations of the artery are as follows. To its outer side at first, is the lower half of the

13th Sept 1894 } * Brachialis anticus lies behind
Int int mus. & p. m. ... triceps.

The ulna nerve lies to inner side of artery
until it reaches the art capsule of the
elbow (2.11) upper 1/2 of it is int.
lower 1/2 is on ext.
mus. p. m.
Int. p. m.

In the upper 1/2 of its course the internal
cutaneous nerve lies int. to artery.

The median vein (a) Basilic lies int & sup.

The Basilic Vein.

coraco-brachialis muscle and when this relation is lost by the insertion of the muscle, it lies to its outer side for the rest of its course the biceps flexor whose belly when the muscle is bulky may overlap it to some extent. At the bend of the elbow the artery passes beneath the slip given off from the inner side of the tendon of the biceps - its relations to cords are as follows -

The artery is accompanied by satellite veins one either side, the inner of the two being the larger - 93 (vide p. 40).

On its inner side are the basilic vein and the internal cutaneous nerve - 95

The median nerve lies first to the outer side of the artery then about the middle of the arm crosses it; usually in front, and descends along its inner side - It should be observed that the basilic vein and the ^{in large 1/2} internal cutaneous nerve are superficial to the artery in the lower part of its course, they here lying upon the investing fascia of the arm and in the fingers of the superficial fascia while the artery is beneath the investing fascia. - 95

internal

behind at cross-section of artery I need not give it. (12) 95

- Relations of the Brachial Artery at the Elbow.

The relations of the brachial artery at the elbow are of such importance that they must be given separately - It lies on the middle of the front of the joint with its satellite veins, one on each side.

On its outer side is the tendon of the biceps muscle - on its inner side is the median nerve -

In front of it is the bicipital fascia and lying on this are the median basilic vein and internal cu

canon
bicipital
fascia

examined

N.B.

between the hookers of traps 95-

transverse nerve. The Brachial artery frequently (once in five times) divides before it reaches the point stated in its description and this is called high or premature division; when this occurs it will be found that the ulnar artery continues the course of the brachial and that the radial descends superficial to the ulnar.

- Branches -

The branches of the brachial are three besides numerous twigs to the muscles in its course and collectively called muscular branches.

I Superior Profunda.

The superior profunda artery arises from the upper part of the brachial and passes downward, backward and outward winding around the humerus in the groove on its posterior face to reach the outer aspect of the elbow joint where it lies in the interval between the supinator longus and brachialis anticus muscles. accom. the musculospiral nerve as

II. Inferior Profunda.

The inferior profunda artery arises from the brachial just below the superior profunda and descends to the inner side of the elbow joint. passing down in accom. the ulnar nerve. as

- III. Anastomotica Magna.

The anastomotica magna runs inward from the brachial about two inches above the elbow and then runs outward on the back of the arm to the external condyle. anastomosing with every artery of the joint.

Get up section at
middle of arm
fore "
& leg. & thigh.

No upper 1/3 - is deep -

Retalians - Behind 95:

Tendon of Biceps
Serpens also Biceps

Thy - Sub - lig -

the Rot - Ten

Thy - Long Pol.

Pro. Quas

Hamus

5th long at fin
pass

- The Arteries of the Fore-arm -

The arteries of the fore-arm are the radial, ulnar and their branches -

- The Radial Artery of the fore-arm -

The radial artery one of the two terminal branches of the brachial commences where that artery divides, about half an inch below the middle of the front of the elbow, and passes downward with such an inclination outward as to bring it to the outer side of the front of the wrist joint, where it lies on the front of the styloid process of the radius -

- Relations -

The muscular relations of the radial artery are as follows; - To its outer side it has throughout its course the supinator longus, the belly of the muscle overlapping it and with this exception the artery is superficial being the one usually chosen to furnish the pulse -

To its inner side is first the pronator radii teres and when this muscle meets its insertion its place is taken by the flexor carpi radialis which continues to the inner side of the artery to the wrist -

Its relations to cords are as follow - It is accompanied by satellite veins and in its middle third the radial nerve is to its outer side the nerve then passing beneath the supinator longus to the back of the fore-arm - This nerve is to the outer side in the upper $\frac{1}{3}$ of the artery but is too remote to be called a relation until it reaches the middle $\frac{1}{3}$ -

- Ulnar Artery on the Fore-arm -

Devidor into deep & superficial portion

95 Sits on the bony part of the Antrum for its upper
portion for its lower portion on the Flex-
Prof. digitorum -

The flex. Sub-Dig. lies to its outer side.

Ulna Artery.

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The ulnar artery the second and larger of the two terminal branches of the brachial begins where that artery forks half an inch below the middle of the front of the elbow and first passing downward and inward to the inner side of the front of the fore-arm to the commencement of the middle $\frac{1}{3}$ then descends to the inner side of the front of the wrist. - the superficial

- Relations -

The muscular relations of the ulnar artery are as follows - In the first part of its course, while it is passing downward and inward, it lies beneath four muscles, pronator radii teres, flexor carpi radialis, palmaris longus and flexor sublimis digitorum, that is, all the muscles in the 1st & 2^d layers on the front of the fore-arm except the flexor carpi ulnaris; when it emerges to the inner side of these muscles it descends with the tendon of the flexor carpi ulnaris to its inner side and the flexor sublimis digitorum to its outer - lying in the profundus dig.

deep

superficial

Its relations to cords are as follow -

It is accompanied by satellite veins one to either side and for its lower two thirds it has to its inner side the ulnar nerve. Soon after it begins it is crossed by the median nerve.

- Continuation of the Ulna into the Hand -

When the ulnar artery reaches the wrist it continues its course into the palm of the hand lying close to and on the outer side of the pisiform bone (i.e.) radial side and on the anterior annular ligament; after passing down a short distance into the palm it turns outward and runs across the palm of the hand

11/11

to its outer side, being covered only by skin and fascia and lying on the flexor tendons. Its course across the palm is known as the superficial arch (arcus sublimis) and though its direction is not transverse still its position is more or less clearly defined by a transverse line across the palm from the bottom of the interval between the thumb and fore-finger. The ulnar nerve continues its relations to the artery into the hand lying to its inner side.

- Branches -

The branches on the fore-arm are four as follows.

I. Anterior ulnar Recurrent -

The anterior ulnar recurrent arises from the ulnar artery just below its origin and passes upward to the front of the inner side of the elbow - (c) inner condyle.

II. Posterior Ulnar Recurrent -

The posterior ulnar recurrent arises just below the preceding and passes upward and backward to the internal condyle - (c) behind it

III. Interosseus -

The interosseus is a large branch which arising from the ulnar just below the elbow quickly forks into the anterior and posterior interosseus. ^{while it is lying under the brachial}

(1) The anterior interosseus descends on the front of the interosseous membrane between the flexor profundus digitorum and flexor longus pollicis muscles to the pronator quadratus passing beneath which it perforates the interosseous membrane and appears on the back of the fore-arm

Some lines were taken from the *Supernatural*
and other parts of the *Book of the Dead*.

Chas. Evans took them all few
quadrants asked att. muscles.

to innervate with the posterior interosseous artery.
It supplies the muscles on its route and gives off
a companion branch to the median nerve.

(2) Posterior Interosseous as soon as it is produced
passes above the interosseous membrane between
the bones to reach the back of the fore-arm and
descend on the posterior aspect of the interosse-
ous membrane to the wrist. Just as it gains the
back of the fore-arm it gives off a large branch
called posterior interosseous recurrent which
ascends to the back of the elbow.

The posterior interosseous artery is distrib-
uted to the muscles adjacent.

V. Muscular.

The muscular branches of the ulnar artery are nu-
merous twigs to the muscles on its course.
The branches at the wrist are two.

I. Anterior Carpal.

The anterior carpal is a branch which passes out-
ward on the front of the wrist to innervate with
the anterior carpal of the radial. *unimportant twigs.*

II. Posterior Carpal.

The posterior carpal passes backward and runs
outward on the back of the wrist to anastomose beneath the
with the posterior carpal of the radial. *in the tendons of the*
The branches in the hand are as follows:— *Distal.*

I. Communicating deep branch

The communicating branch dips between the ab-

No such thing as dorsal digital branch.

The radial artery. in passing to the
back of the hand goes between the

Ext. vs met. ph-

" prox. inter-met. ph-

" Second- " " "

in passing back into the hand
it passes through the 1st dorsal
inter-met. space,

296

ductor minimi digiti flexor brevis minimi digiti
muscles to join the termination of the radial.

II. Digital.

It should be observed that the thumb and the four fingers each have four arteries running from base to tip; two on the sides of its palmar aspect called palmar collateral digital arteries and two smaller ones on the sides of the back called dorsal collateral digital; and this statement will also be found true of the nerves. The digital arteries under consideration are four in number, from the superficial palmar arch the first is a small one which supplies the inner side of the palmar aspect of the little finger. The second passes forward to the cleft between the little and ring fingers where it divides and forms the collateral digital arteries for the adjacent sides of these fingers on their palmar aspect; the third does the same for the adjacent sides of the ring and middle fingers and the fourth does the same for the adjacent sides of the middle and fore fingers.

- Continuation of the Radial Artery -

When the radial artery reaches the wrist it turns outward, backward, and downward beneath the extensor tendons of the thumb, viz. the *extensor ossis metacarpi*, *extensor primi internodii* and *extensor secundi internodii*, in the order of relative sequence and passing through what is known as the snuff-box, that is the arched interval between the *extensor ossis metacarpi pollicis* and *extensor primi*

Branches of the Radial
Recurrent Radial
Muscular
Superficial
Arteries - Cervical
Pulmonary
Dorsal, Polaris

internodii pollicis on one side and extensor secundi internodii pollicis on the other; the artery thus reaches the back of the hand where however its appearance is only momentary for it at once dips into the palm of the hand by passing between the two heads of the 1st dorsal interossea muscle and passes across the palm from its outer to its inner side there terminating by anastomosing with the communicating branch of the superficial palmar arch. The position of the radial in the palm is deep lying on the bases of the metacarpal bones and beneath the flexor tendons which separate it from the superficial arch; this portion of the artery in the palm of the hand is called the deep palmar arch and it is situated about $\frac{1}{2}$ an inch nearer the wrist than the superficial arch.

- Branches of the Radial Artery -

The branches on the fore-arm are as follow.

I. Recurrent Radial.

The recurrent radial arises from the radial artery just below the elbow and passes upward and outward to the outside of the front of that joint. *mus. with sent info*

II Muscular.

The muscular branches are numerous twigs to the muscles in the course of the artery.

At the wrist the branches are as follows.

I Superficialis volae.

The superficialis volae leaves the radial artery just as it turns outward and passes on to the muscles of the thenar group usually perforating the Abductor pollicis.

See on back of wrist joint

II. Anterior Carpal-

The anterior carpal branch passes inward on the front of the wrist-joint to form the anterior carpal arch by uniting with the anterior carpal of the ulnar artery-

III. Posterior Carpal-

The posterior carpal passes inward across the back of the wrist to innervate with the posterior carpal of the ulnar and form the posterior carpal arch- From this posterior carpal arch there pass down on the dorsal interosseous muscle two branches called posterior interosseous besides another which runs along the dorsal aspect of the ulnar border of the hand to supply the ulnar side of the dorsal aspect of the little finger: the two posterior dorsal interosseous pass downward and divide the one at the cleft between the little and ring to form dorsal collateral digital branches for adjacent sides of these fingers; while the other furnishes dorsal collateral digital branches for adjacent sides of the ring and middle fingers-

IV. Dorsalis Pollicis-

Just as the radial is passing the root of the thumb it gives two small branches, each to course along the side of the dorsal aspect of the thumb; these being called dorsalis pollicis-

-V Metacarpal

The metacarpea is a branch which descends on the second dorsal interosseous muscle to the cleft between the middle and index fingers and there

The digital arty in anterior of hand connect
run betw 1st Phalanx

Perforating artyo.

299

divides to form dorsal collateral digital branches for three fingers -

□ Dorsalis Indicii -

The dorsalis indicis is a small branch which passes forward to form the dorsal collateral digital branch for the outer side of the index finger -

- VII. Princeps Pollicis -

The princeps pollicis arises just as the radial dips into the palm and passes forward and outward to divide and form the collateral digital arteries for the palmar aspect of thumb.

The branches in the palm of the hand or from the deep palmar arch are as follows -

I. Radialis Indicii -

The radialis indicis passes forward to form the collateral digital branch for the outer side of the palmar aspect of the index finger -

II. Interosseus (anterior)

The anterior interosseous branches are three or four small branches which pass forward on the front of the interosseous muscles to unite with the digital branches of the superficial Arch -

Besides the deep arch gives off two sets of unimportant branches called perforantes and recurrentes -

- The Left Subclavian Artery -

The left subclavian artery differs from the right in its first portion only which extends from its origin to the inner edge of the scalenus anticus

Carlina death to connect heart around
heart

muscle - Arising as the last of the three branches from the arch of the aorta it ascends almost perpendicularly to the inner edge of the scalenus anticus muscle and then turns suddenly outward behind that muscle to pursue a corresponding course to the artery of the opposite side.

Relations - In front of it is the confluence of the left internal jugular and left subclavian veins to form the left vena innominata and the left pneumogastric and phrenic nerves descend on its front into the thorax - To its inner side are the left common carotid artery and the trachea -

Behind it the thoracic duct - On its outer side the left pleura and lung - (The muscular relations of the first portion of the left subclavian are about the same as those of the right.)

- Thoracic Aorta -

The course and relations of the thoracic aorta have been already given - (vide pp - 41-43.)

- Branches -

The branches of the thoracic aorta are as follows, except some small ones to the pericardium called pericardiac and others to the posterior mediastinum called posterior mediastinal -

I. Bronchial -

The bronchial arteries usually three in number two to the left lung and one to the right, course along the branches to the lung and ramify with the bronchial tubes - descending pt of arch gen

1st one comes from the lower jaw pt of and is white

comes off from back anta —

Belus + Ma arbor.
+ Thucic dust

come off from front. 4-5 in no

II. Intercostal-

The intercostal are ten pairs of arteries which arise from both sides of the thoracic aorta and run out in the intercostal spaces, the uppermost intercostal space being supplied by the superior intercostal of the subclavian artery.

Each intercostal artery passes outward in the intercostal space to run ~~along the lower border of the~~ ^{up the intercost. space -} ~~rib above~~ and going some distance gives off a branch which sinks its course along the upper border of the rib below. The intercostal arteries for the right side are longer than those for the left owing to the position of the aorta forcing them to cross the vertebral column. These intercostal branches of the thoracic aorta are sometimes known as the posterior intercostal arteries in contradistinction to the anterior of the internal mammary and the superior of the subclavian.

III. Oesophageal-

The oesophageal are four or five small twigs which are furnished to the oesophagus successively.

- Abdominal Aorta-

The course and relations of the abdominal aorta are given on pp - 41-44.

- Branches-

The branches of the abdominal aorta are nine in number and are arranged into three sets, those distributed to the abdominal walls and called parietal branches; those distributed to the abdominal

9.05 up to 10.00 and 10.00 to 11.00

The river around under conditions of Brown Bay area
+ divide with 2 sets -

viscera, which are the organs of digestion and accessory thereto and those distributed to the genito-urinary organs; there being three arteries in each of these sets (some of the arteries however being double, that is one to each side.)

- 1st Parietal Branches-

I. Phrenic Arteries-

The phrenic are a pair of small arteries arising from the front of the aorta soon after it enters the abdomen sometimes singly, sometimes by a common trunk and sometimes from neighboring arteries. Each artery runs upward and outward on the under surface of the diaphragm and is there distributed by two branches one passing inward to anastomose over the oesophageal opening with the opposite artery, while the other runs outward to supply the circumference of the diaphragm.

II. Lumbar Arteries-

The lumbar arteries are four or five pairs of small branches, which spring successively from the back of the abdominal aorta and run outward to ramify in the broad muscles of the abdomen, resembling the intercostal branches of the thoracic aorta.

III. Sacra Media-

The arteria sacra media is a small slender artery which arises just at the fork of the aorta or sometimes from one of its forks and runs down on the centre of the front of the sacrum to the coccyx.

2^d Visceral Branches-

Close to the Edge of the arctic opening of
the Reph.
On each side and surrounding
is the semi-lunar ganglion
So behind, the Strm. slightly.

Splenic vein is below and behind the ^{artery}
" " " " " " a "canal."

I Coeliac Axis-

The coeliac axis is a short trunk, some $\frac{1}{2}$ inch in length, which arises from the front of the abdominal aorta, near its commencement, just above the head of the pancreas and about on a level with the lesser curvature of the stomach. Its branches are three, gastric, splenic and hepatic.

(1) The Gastric Artery-

The gastric artery passes to the left to reach the cardiac extremity of the stomach and then turns to the right to run along the lesser curvature to near the pylorus where it anastomoses with the pyloric branch of the hepatic artery. It distributes branches to both sides of the stomach.

(2) The Splenic Artery-

The splenic artery passes tortuously to the left along the upper border of the pancreas to the hilum of the spleen where it splits into numerous branches to be distributed to that organ. The branches of the splenic artery are as follows:-

(a) Pancreatic - *Major + Parva.*

The pancreatic are numerous small branches which descend into the pancreas from the splenic artery as it is coursing along the upper border.

(b) Vasa Brevia -

The vasa brevia are five or six branches which leave the splenic artery near its terminal branches and are distributed to the splenic end of the stomach (c) - Gastro-splenic Sinistra -

On the folds of the gt. mesenteron.

Relations to duct. & to vein?
also lies behind omegon mesenteron

Paucicell. to Ductus

The Left Gastro-epiploic is a large branch which leaves the splenic artery near the spleen and runs to the right along the greater curvature of the stomach until it meets the right gastro-epiploic about midway of the curvature. It is distributed from the greater curvature of the stomach by branches to both its faces and to the great omentum, hence its name, epiplo- = omentum.

(3). The Hepatic Artery-

The Hepatic is a large branch which ascends to the right to the under surface of the liver where it divides into three branches, one to each lobe of the liver and a third called the cystic artery which is distributed to the coats of the gall-bladder. Besides its three terminal branches the hepatic produces two ~~branches~~ ^{being in the ~~side~~ of the ~~main~~ ~~artery~~}

(a) The Pyloric artery-

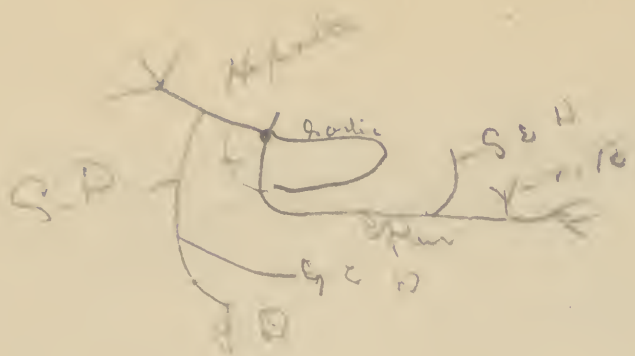
The pyloric branch passes to the left along the lesser curvature of the stomach until it meets the gastric artery, being distributed to both faces of the stomach - coming off about the upper border of the lesser curvature of the stomach.

(b) The Gastro-duodenalis-

The gastro-duodenal is a large branch which descends from the hepatic artery behind the pylorus and divides into two-

1st Pancreatico-duodenalis superior - which descends between the pancreas and duodenum and is there distributed.

2^d Gastro-epiploica Dextra - which passes to the left along the greater curvature of the stomach to meet the left gastro-epiploic.



line between the folds of the mesozoic

II. The Superior Mesenteric Artery-

The superior mesenteric is a large artery, which arising from the front of the aorta, just below the coeliac axis and behind the head of the pancreas descends between the lower border of the pancreas and the transversa duodeni to reach the right iliac fossa presenting in its course a curve whose convexity is to the left and lying between the layers of the mesentery-

- Branches-

Besides a small branch called inferior pancreaticoduodenal which ascends between the head of the pancreas and the duodenum, the branches of the superior mesenteric artery are as follows-

(1) Vasa Intestini Tenia-

Arising successively from the convex aspect of the superior mesenteric artery are fifteen or twenty branches which are distributed to the small intestine from the duodenum to near the ileo-colic aperture and called the vasa intestini tenia- After running a short distance these branches divide and unite with adjacent ones so as to form arches from which branches proceed and these again divide and unite so as to form another series of arches and from this 2^d series a third is produced from which small vessels pass to supply the intestine- These vessels at last are united

(2)- Ileo-colic Artery-

The ileo-colic artery is the lowest of the three branches given off from the right or concave aspect of the

constrains with the critical media ² ₁ ^{1/2}



but 2 in above its bifurcation.

superior mesenteric and is distributed to the termination of the ileum and beginning of the large intestine -

(3) Colica dextra -

The colica dextra artery is the middle of the three arteries arising from the right side of the superior mesenteric and is distributed to the ascending colon.

(4) Colica Media -

The colica media artery is the first of the three branches arising from the right aspect of the superior mesenteric and turning upward is distributed to the right half of the transverse colon and termination of the ascending colon. All these branches of the superior mesenteric anastomose with each other successively in the order in which they are given and the colica media anastomoses with the colica sinistra branch of the inferior mesenteric -

III. Inferior Mesenteric -

The inferior mesenteric artery, rather smaller than the superior, arises from the front of the aorta near its termination and descends obliquely to the left iliac foramen giving off the following branches -

(1). Colica Sinistra -

The colica sinistra passes outward to the left and divides into two branches, one of which is distributed to the descending colon while the other ascends to supply the left half of the transverse colon and anastomose with the colica media branch of the superior mesenteric -

Passes over the front of the left
Com. iliac



(2) - Sigmoidal -

The sigmoidal are several branches distributed to the sigmoid flexure of the colon - all 3-4 have branches.

(3) Superior Hemorrhoidal -

The superior hemorrhoidal is the continuation of the inferior mesenteric artery; it descends along the middle of the posterior aspect of the rectum to about its middle where it divides, being distributed to the rectum -

(The branches of the inferior mesenteric anastomose with each other and its colica sinistra branch with the colica media of the superior mesenteric -

Summary of the arterial supply of the stomach and intestines: The stomach is supplied with blood by the following arteries the lesser curvature by the gastric and pyloric branch of the hepatic; the greater curvature by the right gastro-epiploic for its right half and by the left gastro-epiploic towards the left; the former being a branch from the gastro-duodenal, is a branch of the hepatic artery and the latter a branch of the splenic artery; the splenic end of the stomach is supplied by the vasa brevia of the splenic - The duodenum is chiefly supplied by the superior pancreatico-duodenalis branch of the gastro-duodenalis from the hepatic artery -

The small intestine from the duodenum to near the large intestine is supplied by the vasa intestini terminis of the superior mesenteric artery - The termination of the small intestine and the

commencement of the large are supplied by the
 ifes-colic branch of the superior mesenteric.

The ascending colon is supplied by the colica dex-
 tra branch of the superior mesenteric artery.

The right half of the transverse colon is supplied
 by the colica media of the superior mesenteric ar-
 tery. The left half of the transverse colon and the
 descending colon are supplied by the colica sinis-
 tra of the inferior mesenteric artery.

The sigmoid flexure of the colon is supplied by the
 sigmoidae branches of the inferior mesenteric ar-
 tery. The upper half of the rectum is supplied by
 the superior hemorrhoidal branch of the inferior
 mesenteric.

3d Genito-Urinary Branches-

I. The Spermatic Arteries-

The spermatic are a pair of small arteries which
 arise from the front of the aorta and descend be-
 hind the peritoneum to the bin of the pelvis, one
 on each side; in the male the artery passes thence
 to the internal abdominal ring and accompanies
 the spermatic cord to the testicle, whereas in the
 female most of the artery is expended on the ova-
 ry and Fallopian tube-

II. Renal Arteries-

The renal artery arises from either side of the
 aorta and passes outward to be distributed to the
 kidney being a large branch. The left renal ar-
 tery is somewhat higher than the right owing to
 the relative positions of the two kidneys.

aorta terminates at the lower
border of the 4th lumbar V

The con. line is crossed by vertebrae.

The run of the right & left iliac runs in to it & see a column
out to it.

The great iliac
artery & P. & V. -
to it

the run of left iliac runs in to it

Gray gives begin of Vena Cava

III. Supra-renal Arteries-

The supra-renal are a pair of small arteries which arise from the side of the aorta about the origin of the renal arteries and pass out one on each side to be distributed to the supra-renal capsule-

- The Common Iliac Arteries-

The common or primitive iliac artery of each side begins where the abdominal aorta bifurcates at the left side of the lower border of the body of the fifth lumbar vertebra as a rule, though the exact point of division may vary as much as an inch: from this point the common iliac passes downward and outward to the brim of the pelvis where it terminates, ^{on the side of} the disk between the 5th lumbar vertebra and sacrum, by dividing into the external and internal iliac arteries. The right artery is slightly the longer - the average length of each being about two inches-

- Relations of the Right Common Iliac-

The right common iliac artery is crossed in front by the right ureter, near its bifurcation. To its outer side is the psoas magnus muscle. Behind and somewhat external is the right common iliac vein and crossing behind it is the left common iliac vein-

- Relations of the Left Common Iliac-

The left common iliac artery is crossed in front by the sigmoid flexure of the colon by the superior

If In front is the water - on it side } Pentamer
" " " " " " " " " " " "
" " " " " " " " " " " "

3 Behind is The Lungs, Great nerve and
" " " int illos vein
" " Pyramis muscle.

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hemorrhoidal artery and by the left ureter near its termination.

External to it is the psoas magnus muscle. Its vein is behind and internal to it. It is thus seen that each vein is more or less to the right of its artery and behind, the left vein being forced to cross behind the right artery in order to unite with the right vein and form the inferior vena cava which lies to the right of the aorta.

584 per 95

The Internal Iliac artery.

The internal iliac artery one of the two terminal branches of the common iliac begins where that artery forks at the rim of the pelvis on the intervertebral disk between the 5th lumbar vertebra and sacrum and descends into the pelvis on the front of the sacro-iliac symphysis to the upper margin of the great sacro-sciatic notch and there divides into an anterior and posterior trunk. The artery varies in length from an inch to two inches. The only relation besides those given is that its vein is immediately behind.

The distribution of the internal iliac artery is to the viscera and walls of the pelvis and it will be found with trifling exceptions that the parietal branches spring from the posterior trunk while the visceral are the offspring of the anterior. It should be remembered that the hypogastric artery of the foetus is a branch of the internal iliac passing from this upward and inward beside the bladder to reach the umbilicus after coursing along the posterior aspect of the anterior abdominal

Branches of Obliteration

In Pelvis -

(3) 1 bisulci
2 Div.

3 Pubic with epigastric Arteries -

out - I int. Branch - adductors, anast. with Circum
flexa I & II Ext " out Rot " Scrotic
thigh joint

Ref. to page 314 ~~III~~
Obliteration

wall and that after birth this artery becomes in-
 pervious from the umbilicus as far back as the
 side of the bladder, but from this point to its ori-
 gin it remains open and gives origin to some of
 the arteries which supply the bladder, viz, those
 which supply its upper and middle portions and
 called the superior and middle vesical arteries.

— Branches of the Anterior Trunk —

I. Inferior Vesical.

The inferior vesical artery is distributed to the base
 of the bladder and in the male also to the prostate
 and seminal vesicle.

II. Middle Hemorrhoidal.

The middle hemorrhoidal artery aids to supply
 the rectum and derives its name from the fact that
 there are two other hemorrhoidal arteries one supply-
 ing the upper part of the gut, and the other the
 anus while the middle takes the intermediate
 portion. Besides these two branches there are some
 peculiar to the female - viz - vaginal to the vagina
 and uterine to the uterus.

III. Obturator.

387 - poy - read -

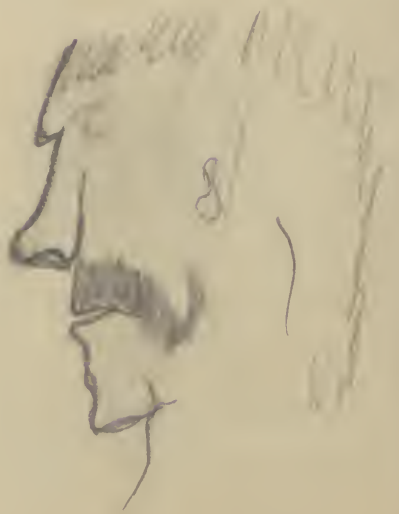
The obturator artery passes forward along the wall
 of the pelvis just below the rim, and escapes through
 the upper part of the obturator foramen to divide
 into an internal and external branch which are
 distributed around the front of the obturator fora-
 men. The obturator artery is frequently a branch
 from the posterior trunk and once in three dissec-
 tions will be found descending to the obturator fora-

[Faint, mostly illegible handwritten notes and scribbles at the top of the page.]



along the false form dig.

[Faint, mostly illegible handwritten notes and scribbles at the bottom of the page.]



men from the epigastric branch of the external iliac.
After giving off the foregoing branches the anterior
trunk forks into two terminal arteries, the ~~ischio~~
or sciatic and the internal pudic.

IV. Ischial.

IV. Ischiatic Artery-

See Gray - 587

The ischiatic artery one of the two terminal branches
of the anterior trunk of the internal iliac leaves
the pelvis through the great sacro-sciatic foramen
below the pyriformis muscle and descending be-
tween the trochanter major and tuber ischii
breaks into numerous branches the most important
of which are muscular. - See 590 Gray.

below

V. Internal Pudic Artery-

588 Gray p. 5 -

The internal pudic artery, the second of the two
terminal branches of the anterior trunk of the in-
ternal iliac leaves the pelvis through the great
sacro-sciatic foramen below the pyriformis mus-
cle and passing across the spine of the ischium
re-enters the pelvis through the lesser sacro-sciatic
foramen and runs forward and upward about an
inch above the lower edge of the tuber ischii and
then along the inner aspect of the ramus of the is-
chium and pubes towards the symphysis pubis.

below

- Branches of the Internal Pudic -

I. Inferior Haemorrhoidal.

The inferior haemorrhoidal are several small
branches given to the anus as the internal pudic
is passing near it.

II. Superficial Perineal.

ramus testis - & testes then junction

crus penis and ramus pubis-junct-

Below -

In pelvis -

Behind

Cyrtiformis

Sacral plexus

out of pelvis

crossed by gluteus max -

in pelvis -

Inf. hem
Sup. Pri } on obturator internus + junction from of S. S. lig
 { alone
 { none
 { + vein

ant of Rect.

{ Penus the deep layer of deep. Per. for an
runs along ramus of pubes
+ penus The superficial layer first dividing
and giving off the art of corpus cavernosum + then
the dorsal art which joins the sup. forin +

Superficial Perineal

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The superficial perineal passes forward through the perineum as far as the scrotum and on its course gives off the Transversa Perinei branch which crosses the perineum.

III. The Artery of the Bulb. Impulse in Scrot.
The artery of the bulb enters the bulb of the corpus spongiosum and is distributed there. Shut beneath deep fascia in sup. layer. - 85

IV. Artery of the Corpus Cavernosum -
The artery of the corpus cavernosum enters the crus penis and is distributed to the corpus cavernosum.

V. Dorsal Artery of the Penis -
The dorsal artery of the penis runs along the dorsum of the penis and as far as the glans.

- Branches of the Posterior Trunk -

I. Lateral Sacral Arteries -

The lateral sacral are a pair of small arteries the superior of which enter the first anterior sacral foramen and the inferior passes down on the side of the front of the sacrum and sends a branch into each anterior sacral foramen except the first.

II. Ilio-lumbar Artery -

The ilio-lumbar artery is a recurrent branch which ascends beneath the external iliac artery and divides into two branches, one continues upward to the psoas magnus and quadratus lum-

$$\begin{array}{r} 25- \\ 95- \\ 4 \overline{) 95} \\ \underline{26-} \\ 225- \\ \underline{23} 5 \end{array}$$

The gluteal artery passes out of the Sacro-
Spinous foramen above the pyriformis
mus. but both the int. Pudic and
and Ischiatic pass out below the Pyr.
mus.

along the inner edge of the V-soon may.
is covered by a process of linear forcia. - stay has
on a process of the linear forcia

314
from muscle while the other turns outward.

III. Gluteal Artery - & Obturator

The gluteal artery is the continuation of the posterior trunk of the internal iliac, it passes backward through the upper part of the great sacro-sciatic foramen above the piriformis muscle and divides into three branches, a superficial which is distributed between the gluteus maximus and gluteus medius muscles and two deep branches which ramify between the gluteus medius and minimus muscles.

- The External Iliac Artery -

The external iliac artery begins where the common iliac forks into it, and the internal iliac, at the base of the pelvis on the disk between the 5th lumbar vertebra and sacrum and continues the course of its parent downward and outward to enter the thigh and become the femoral artery by passing beneath Poupert's ligament at a point about half way from the anterior superior spinous process of the ilium to the symphysis pubis.

Its course and that of the common iliac may be indicated by drawing a line from a point just to the left of the umbilicus, which corresponds to the bifurcation of the aorta downward and outward to a point half way from the anterior superior spinous process of the ilium to the symphysis pubis.

- Relations -

W. Reference to p. 311

Oblurator arty. sometimes arises (from)
in common deep epigastric.

I By a common branch with it
in which case it will descend
(in common) close to the
inner side of the external
iliac vein.

II as a highly developed pubic
branch of the Epigastric in which
case it will descend to the
inner side of the Femoral Ring.
once in $3\frac{1}{2}$ times the obturator arty. arises
in common with the deep Epig.
gen. they arise by a com. trunk &
will pass down with ext. Iliac
vein. Sometimes this a high deep
pubic branch of the deep Epig.
arty. This is the artery that gives the lower
border of the body of the penis

When much larger than the other

9-18-18

On front wall of the abdomen - the

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On the outer side of the artery is the psoas magnus muscle separated from it by iliac fascia which thence covering over them - In front of it is the peritoneum and some fascia. (Spinaum ditto)
Each artery is accompanied by a vein the relation to which is different on the two sides -
The vein of the left artery is internal to it throughout - The vein of the right artery is first behind and external then behind and then internal; so that each vein at Poupart's ligament is internal to its artery - see fully almost the same on left side the vein is to the right of the artery at

See
p. 592

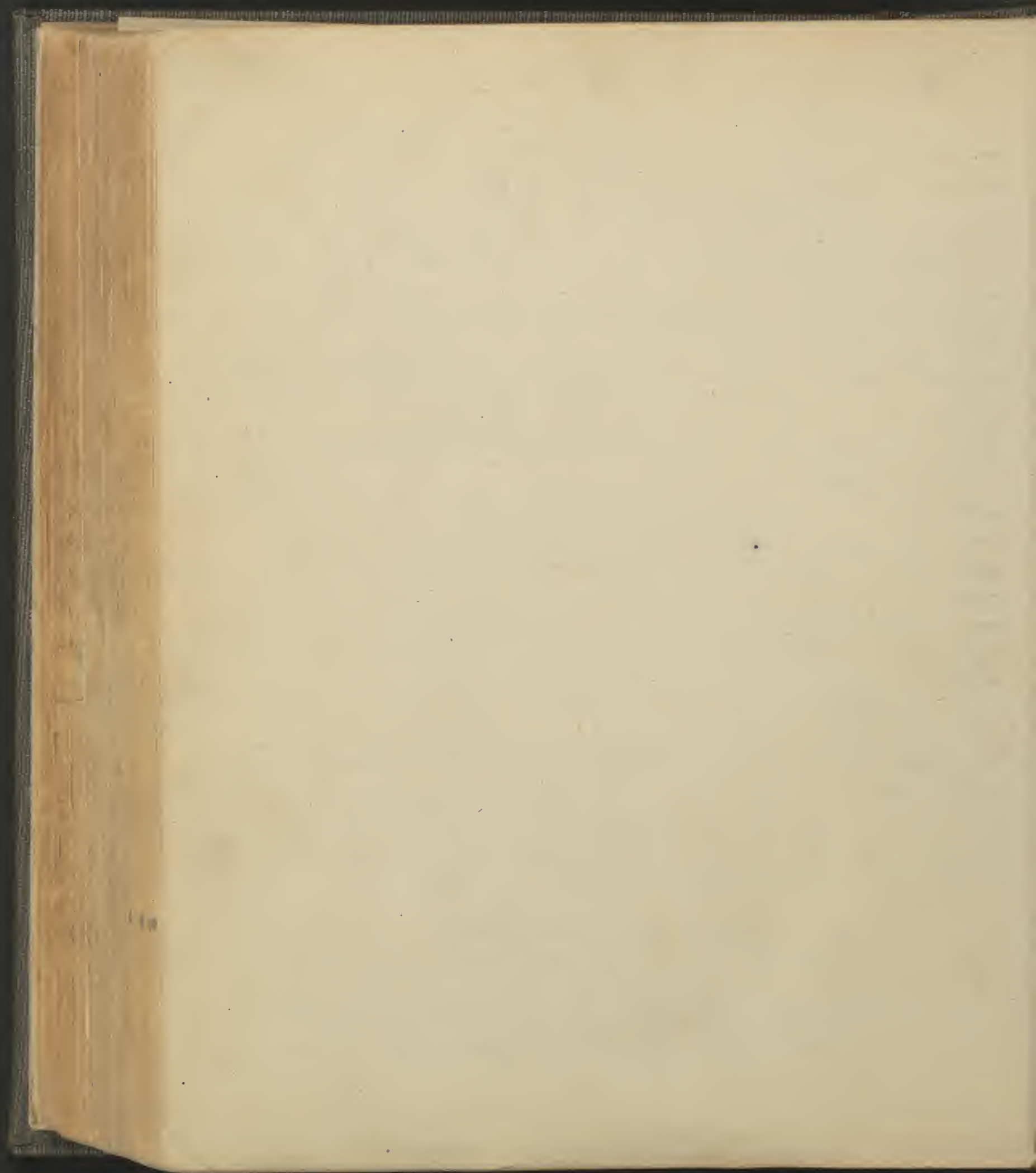
- Branches -

Deep Epigastric Artery -

The epigastric artery arises from the inner side of the external iliac near Poupart's ligament and runs upward and inward on the inner face of the anterior abdominal wall lying just beneath the peritoneum and transversalis fascia which it raises into a ridge and enters the sheath of the rectus muscle where it anastomoses with the superior epigastric branch of the internal mammary artery thus forming the most remarkable anastomosis in the body -
Soon after its origin the epigastric artery gives off a small communicating branch which descends to the obturator artery, and indeed sometimes supplies the place of the obturator.

Deep Circumflex iliac Artery -

The circumflex iliac arises from the outer side of the external iliac just above Poupart's ligament and passes upward and outward along the crest of the ilium and about the middle of it gives off a large



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ascending branch which is distributed between the internal oblique and transversealis muscles -

-The Femoral Artery-

The femoral artery is the continuation of the external iliac, commencing where that artery terminates beneath Poupart's Ligament at a point about midway ^{not} between the anterior superior spinous process of the ^{Poupart's} ilium and the symphysis pubis where it can be ^{fig.} felt pulsating beneath the skin; it descends the front of the thigh to its lower third where it pierces the insertion of the adductor magnus muscle to reach the back of the thigh and become the popliteal; as long as it lies on the front of the thigh, that is for the upper two-thirds of the thigh the artery is called femoral as soon however as it reaches the back of the thigh which it does at the commencement of the lower third of the thigh by piercing the adductor magnus the artery takes the name of Popliteal.

The course of the femoral artery may be indicated by a line drawn from the point where the artery commences beneath Poupart's ligament which is usually half way from the anterior superior spinous process of the ilium and the symphysis pubis, down the front of the thigh to the inner aspect of the internal condyle of the femur; the artery will lie behind the upper two-thirds of this line; the point where this line should begin can be better determined by feeling for the pulsation of the artery beneath Poupart's ligament.

rests on the upper border of the body of the
dubio sep. by pectineus.


and is app. the middle of the head of the
sewer.

Relations-

For the first half $\frac{1}{3}$ varying of its course the femoral artery lies superficial in Scarpa's triangle (see vol. 10. p.) having the sartorius muscle to its outer side and the adductor longus muscle to its ^{last} ~~inner~~ side; it enters the triangle about the middle of its base and passing through its centre it usually leaves it at the apex by passing beneath the sartorius muscle and descends lying on the ^{behind} front of the insertion of the adductor longus which relations it maintains to within about an inch or so of its termination but that extent it is separated from the posterior face of the sartorius by the tendinous arch which the adductor longus and adductor magnus ^{throw} over it to the vastus internus muscle; so that the last inch or two of the femoral artery is the deepest being covered by the skin, superficial fascia, fascia lata, sartorius muscle and the tendinous arch above mentioned. Let it be observed that the artery lies throughout its course between the sartorius and adductor longus muscles, in the upper half of its extent it has three muscles to its sides, the sartorius external and the adductor longus internal; in the lower half of its extent has the sartorius in front and the adductor longus behind; though just as the artery terminates it is separated from the sartorius by the tendinous arch.

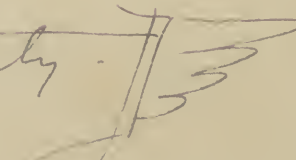
The relations of the femoral artery to cords are as follows - It lies in a sheath which also contains the femoral vein, the vein at Poupard's ligament is internal, but as it descends it gradually gets

and lastly arrest

The artery is covered by the Saphenous. nerve
which after crossing is continued down
the side of the leg. 

The int. cut. nerve crosses the artery abt middle
of the calf.

The nerve comes the same back to Ant. with &
is ext to artery.

inner side of F. artery. 

behind the artery and then external to it.
 In the first few inches of its course the artery has
 from one fourth to the half of an inch to it, outer
 side the anterior crural nerve which here divides
 into numerous branches and one of these the long
 saphenous nerve descends close to the outer side of
 the artery but not within the sheath. *is in course of artery*
this nerve some times crosses it in front of artery

- The Branches of the Femoral Artery -
 Soon after its commencement the femoral artery
 gives off four small branches all of which are cu-
 taneous: they are the first four as follows. + are cutaneous.

I. Superficial Epigastric -

The superficial epigastric artery passes upward
 and inward towards the umbilicus beneath skin
 and fascia -

II. Superficial Circumflex Iliac -

The superficial circumflex iliac runs upward and
 outward along the crest of the ilium -
to femoral vein

III. Superficial External Pudic -

The superficial external pudic artery passes in-
 ward in front of the femoral vein toward the
 genital organs -
relies the femoral vein

IV. Deep External pudic artery -

The deep external pudic artery runs inward be-
 hind the femoral vein to be distributed to the in-
 tegument of the external organs of generation -

you are worth and a half $\frac{1}{2}$



Y Profunda Femoris Artery-

At a variable distance from its commencement, generally from one to ~~two~~^{three} inches, though sometimes it is less and sometimes more than this, the femoral artery gives off from its outer posterior aspect a branch the profunda femoris artery which is almost as large as the continuation of the femoral itself. The direction of the profunda is first for a very short distance downward and outward but then curving inward almost immediately from its origin, it descends vertically lying behind the femoral artery and having no muscle interspersed until the two arteries reach the upper edge of the adductor longus muscle when this muscle thenceforward separates them, the femoral passing down on the front of it and the profunda descending it behind it some distance and then perforating the adductor magnus muscle to reach the back of the thigh and be there distributed.

The profunda artery is contained in a sheath in which lies also its vein, the vein being in front of the artery; now as the profunda artery is descending behind the femoral artery it is separated from it by the two veins femoral and profunda, so that from the origin of the profunda artery down to the upper edge of the adductor longus muscle that is to the commencement of the middle third of the thigh, the vessels lie one behind the other in this order from before backward femoral artery, femoral vein, profunda vein, profunda artery-

-Branches of the Profunda Artery-

outer side of the P₁₁₃

inner back part of the P₁₁₃

(1) External circumflex-

The external circumflex artery arises from the early portion of the profunda and passes outward around the upper extremity of the femur giving off two sets of branches, one, ascending, to the gluteal region and the other, descending, to the outer aspect of the thigh and knee-joint.

(2)-Internal circumflex-

The internal circumflex artery arises from the profunda near its commencement and is much smaller than the external circumflex; it passes inward around the upper extremity of the femur and anastomoses with the external-

(3) The three Perforating Arteries-

As the profunda femoris artery is descending it gives off in succession three branches, each called perforating, superior, middle and inferior: these derive their name from the fact that they pierce the adductor magnus muscle and the superior the adductor brevis muscle also, to reach the back of the thigh and supply the posterior femoral muscles-

VI. Anastomica Magna-

The anastomica magna the last branch of the femoral artery arises from it just as that artery is about to perforate the adductor magnus and descends towards the knee after dividing into a superficial and a deep branch-

Besides the six foregoing branches the femoral artery gives off muscular branches to the muscles

J. Spurg Wilson M.L. (41)

Dear Doctor —

You are an infamous
pittifogger "You know"

Yours in health

Long G.M. Godfrey M.L. (48)

Very truly Yours

The great body of men, maintain-
ing a guard to his acty -
Dixon

on its route.

602 295 327

- The Popliteal Artery -

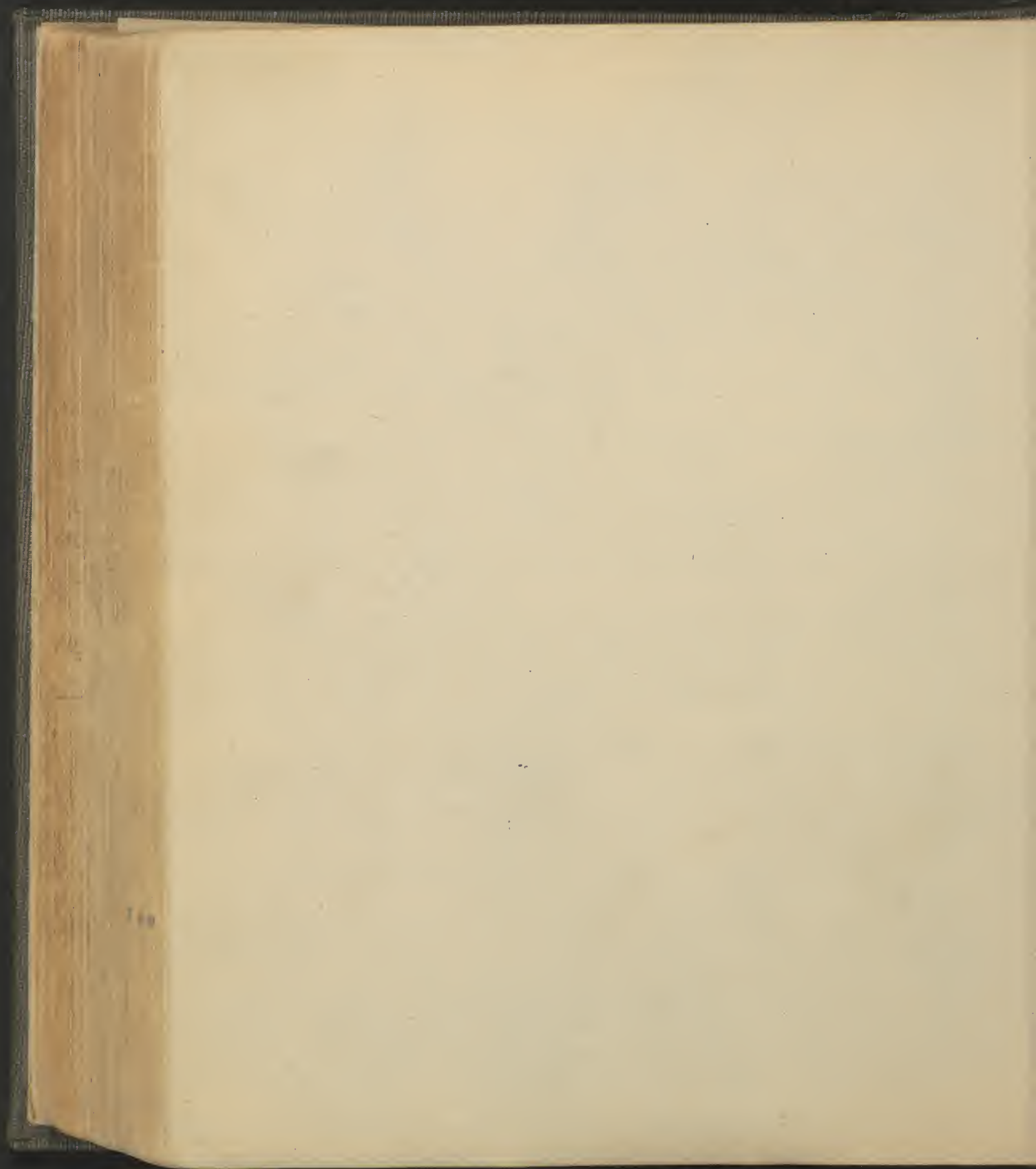
The popliteal artery is the continuation of the femoral; beginning where that artery terminates on reaching the back of the thigh by perforating the adductor magnus muscle at the junction of the middle and lower thirds of the thigh the popliteal artery passes downward and outward (the outward inclination being greatest at first) through the popliteal space (vide vol. II. p. 84) to terminate at the lower border of the popliteus muscle where it is passing beneath the tendinous arch of the soleus by dividing into the anterior and posterior tibial arteries.

The artery rests successively on the posterior aspect of the lower third of the femur, the posterior ligament of the knee-joint and the popliteal fascia which separates it from the popliteus muscle and is surrounded by the mass of fat which fills the popliteal space. It has on its outer side above the knee the tendon of the biceps and then the outer head of the gastrocnemius - + *Anterior - Semi-tend. + inner head of Gastrocnemius* -

The relations to cords are as follows.

The artery is accompanied by the popliteal vein and the internal popliteal nerve.

The artery is the deepest of the three cords; next it and hugging it closely is the vein which is external to the artery as well as superficial; the nerve is the most superficial and also somewhat external to the vein separated from it by the interposition of some fat. Now when the artery reaches the commencement of the lower third of its course these rela-



tions change for here the vein and nerve cross, superficially, to its inner side, where they continue to the termination of the artery.

It should be observed that at the commencement of the artery and its vein lie some distance to the inner side of the internal popliteal nerve because the nerve enters the popliteal space at its superior apex whereas the artery and vein enter the space some little distance down on the inner side; but since the vein and artery have an outward inclination and the nerve slightly the opposite they soon come into closer relation. This internal popliteal nerve is one of the two terminal branches of the great sciatic which descends the centre of the back of the thigh and divides just as it reaches the superior apex of the popliteal space sending its other terminal branch, the external popliteal downward along the outer side of the space.

-Branches-

The branches of the popliteal artery are in number -
I. Superior External Articular - II. Superior Internal Articular. III. Inferior External Articular. IV Inferior Internal Articular - V Azygos Articular - VI Muscular.

The superior articular arteries surround the lower extremity of the femur just above the knee, the external passing beneath the tendon of the biceps and the internal beneath the tendon of the adductor magnus. The inferior articular arteries surround the upper extremity of the tibia just below the knee. The azygos articular is a single branch which per-

Post. Tibial.

Branches { Peroneal, ant. Peroneal, muscular
Nutrient? communicating and
internal calcaneus

Arteria Nutrientis the int. malleolar
Arter. (Peroneal ^{or int.} Achilles) middle
of foot and 3 or 4 cm. 95

95 Gray

Int. foot.

Int. Post

Flex. leg dig

Tibia

Ant. foot

95
Payette

fracture the posterior ligament to enter the knee-joint. The muscular arteries may be divided into two sets, superior muscular, which are distributed to the hamstring muscles and inferior muscular or anal, which are given to the gastrocnemius muscle.

- The Posterior Tibial Artery -

The posterior tibial artery one of the two terminal branches of the popliteal, begins where that artery terminates, at the lower border of the popliteus muscle beneath the tendinous arch of the soleus muscle and descends the back of the leg with a steady inclination inward to the inner aspect of the malleolus where it divides between the tendo-Achillis, into the internal and external plantar arteries -

91 weight -

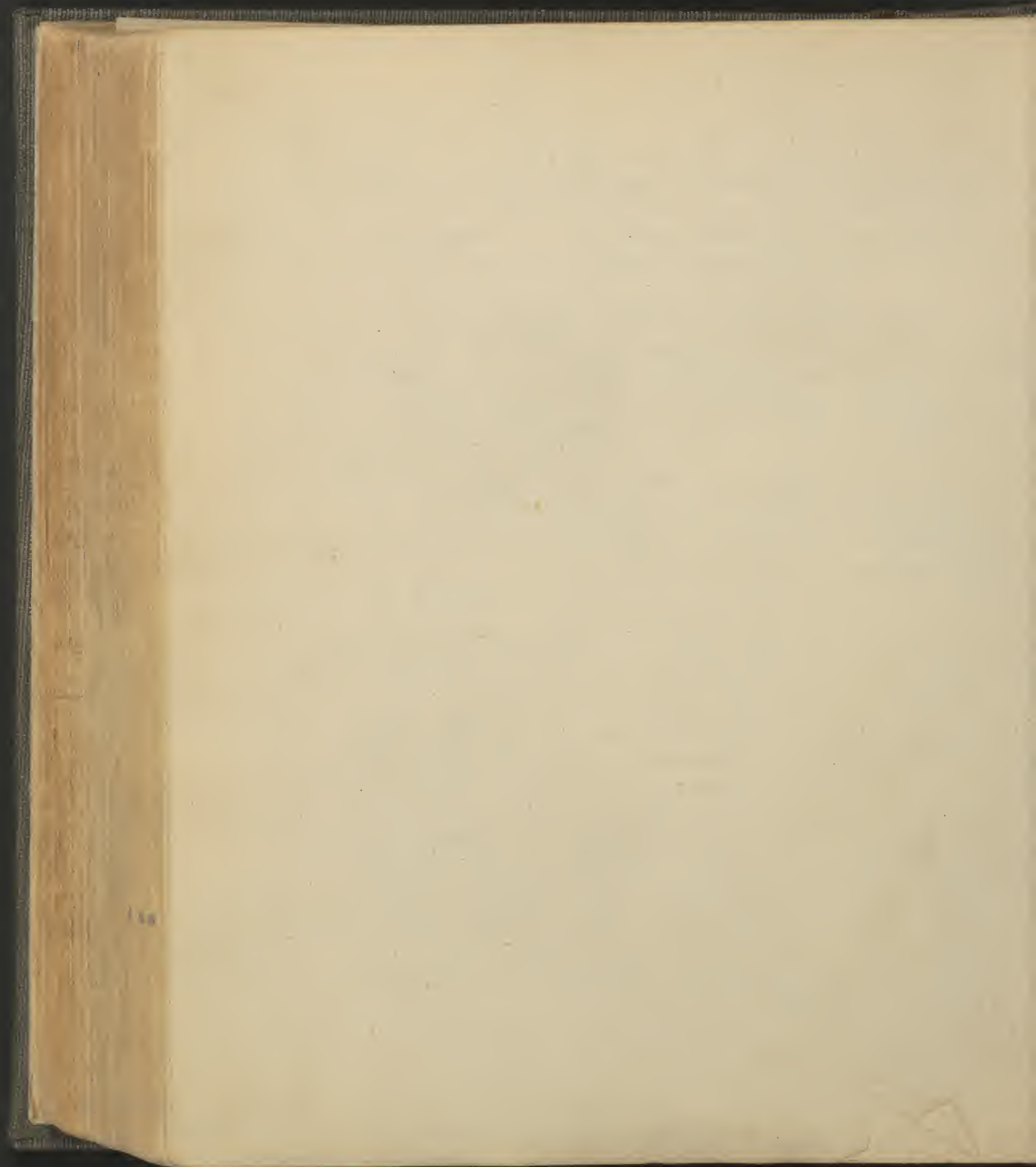
- Relations -

The posterior tibial artery is about the upper two-thirds of its course lies deeply covered by the triceps surae but for the rest of its course it is superficial, having emerged to the inner side of the tendo-Achillis, because of its own inward inclination and because of the narrowing of the triceps surae to a tendon.

The artery is accompanied by satellite veins and by the posterior tibial nerve.

The posterior tibial nerve is for the first few inches of the artery (to the lower part of the upper third of the leg) to the inner side of the artery and then crosses posteriorly to assume a continuous external relation -

course just
where the
nerve and
artery are
125.



- Branches -

Besides muscular to the muscles, in its course and its two terminal branches, the posterior tibial produces two branches, Peroneal and internal calcanean. One of its earliest muscular branches gives off a recurrent branch which passes upward to the knee-joint.

I. Peroneal Artery-

The peroneal artery is nearly as large as the continuation of the posterior tibial and arises from that artery high up near its origin, the distance being about two inches. It first passes obliquely downward and outward to the origin of the flexor longus pollicis muscle and then descends vertically beneath that muscle to terminate on the outer side of the os calcis.

- Relations -

The peroneal in the upper, oblique, part of its course is covered like its parent by the triceps but after reaching the flexor longus pollicis it is covered by that muscle in addition; in the lower part of the leg the difference in depth between the peroneal and posterior tibial arteries is very great since here the posterior tibial is superficial whereas the peroneal is covered still by the tendo Achillis and flexor longus pollicis.

- Branches -

Just above the posterior tuberosity of the os calcis the peroneal and posterior tibial arteries are connected

envelope of and posterior in arm.

by a small transverse communicating branch - The peroneal gives muscular branches to the muscles in its course - About the lower third of the leg the peroneal gives off a large branch the anterior peroneal which pierces the interosseous membrane to reach the front of the leg - The termination of the peroneal is distributed on the outer side of the heel by branches called external calcanean - ³²⁵

II Internal Calcanean Branches.

The internal calcanean branches of the posterior tibial artery are three or four in number and distributed to the inner side of the heel.

- The Internal Plantar Artery -

The internal plantar artery, one and much the smaller of the two terminal branches of the posterior tibial, begins where that artery bifurcates between the internal malleolus and ~~tendon~~ ^{tendon} of Achilles, and passes forward along the inner side of the sole to terminate on the inner side of the great toe having given off muscular branches in its course.

- The External Plantar Artery -

The external plantar artery is the second, the larger and more important of the two terminal branches of the posterior tibial and begins where that artery forks between the internal malleolus and ~~tendon~~ ^{tendon} of Achilles and passes outward and forward ~~between the 1st and 2nd layers of muscles in~~ ^{between the 1st and 2nd layers of muscles in} the sole to the base of the 5th metatarsal bone and then turns inward beneath the 3^d layer of muscles ^{between the 3^d and 4th layers of muscles}

The 4th plantar artery lies just between the 1st & 2nd Phalanx
between 1st & 2nd Dig. ^{1st} Flex. vasorum above
" at base of little toe between flex. 1st & 2nd Dig.

The moving point is deep lying in 'extensor' muscles.

Ant. & Post. perforating - Arteries

to cross to the inner side of the sole and terminate there at the posterior extremities of the first interosseous space by anastomosing with the artery of the dorsum of the foot which sends a branch through to meet it. That portion of the external plantar artery which crosses the foot from the outer side of the sole to the inner is called the plantar arch.

- Branches -

Besides muscular branches the external plantar gives off the following Digital and posterior Perforating.

I. Digital Arteries -

The digital branches are four and running forward to the clefts of the toes they then divide into collateral digital branches which supply the plantar aspect of the sides of the toes except the great toe and the inner side of the next toe: the outermost of the digital branches is appropriated to the outer side of the little toe. Just before the digital arteries divide at the clefts of the toes they send up each between the metatarsal bones a branch called anterior perforating to open its digital branches on the dorsum.

II. Posterior Perforating -

The posterior perforating, three in number, pass up between the heads of the three outer interosseous muscles to anastomose with the metatarsal artery on the dorsum of the foot.

- The Anterior Tibial Artery -

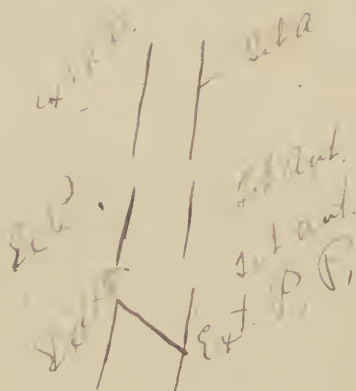
its relations in ref. to mus well be asked on clinical exam.

Ant. Tibial

Branch { Recurrent Tibial? Int. Malleolar
Muscular Ext. " " " "

AB To find it on board of leg turn over the foot lateral
you see it.

begins just out the neck of fibula



Anterior Tibial

327

The anterior tibial artery begins where the popliteal forks, at the lower border of the popliteus muscle beneath the tendinous arch of the soleus and passes directly forward between the tibia and fibula to the front of the leg, which it descends, lying for the upper two-thirds of its course on the interosseous membrane and for the lower third on the front of the tibia, it terminates on the middle of the front of the ankle-joint beneath the anterior annular ligament by assuming the name of the Dorsalis Pedis artery.

- Relations -

The anterior tibial artery is divided into three portions, upper, middle and lower third.

In its upper third it lies on the interosseous membrane and between the tibialis anticus muscle on its inner side and the extensor longus digitorum on its outer. In its middle third it still lies on the interosseous membrane but it has here reached the origin of the extensor proprius pollicis and this muscle lies to its outer side while internally it still has the tibialis anticus.

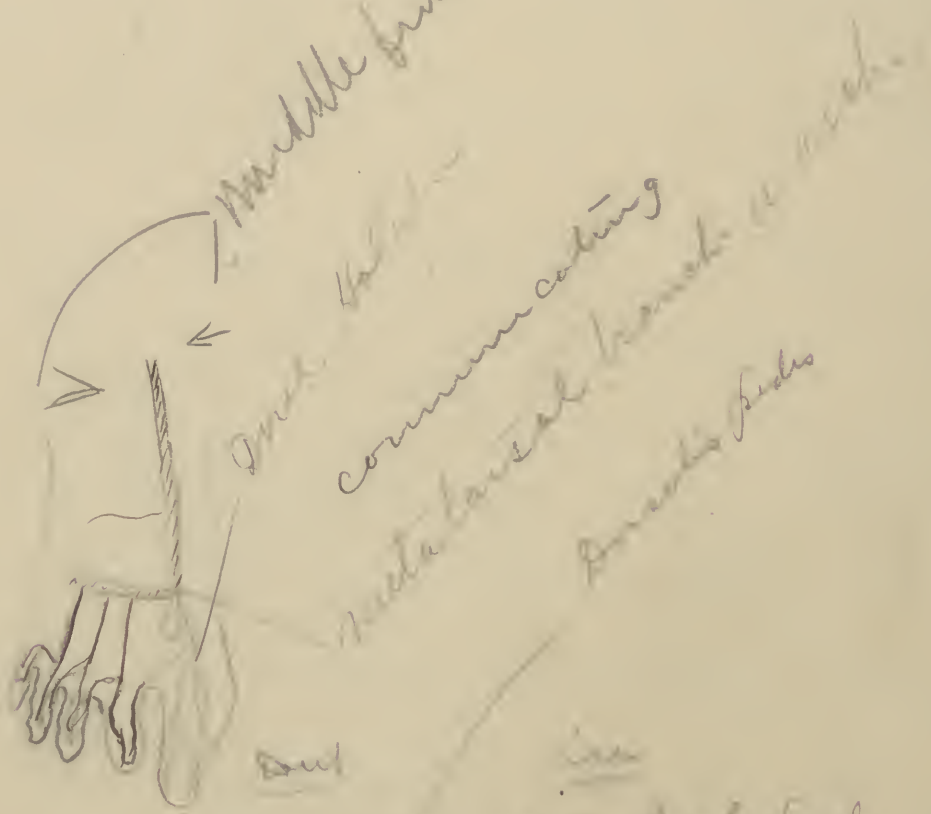
In its lower third it lies on the front of the tibia and is obliquely crossed by the tendon of the extensor proprius pollicis which then lies to its inner side displacing the tibialis anticus, while to the outer side of the artery is the extensor longus digitorum again which was separated from it in its middle third by the extensor proprius pollicis.

The artery is accompanied by satellite veins and the anterior tibial nerve, the nerve is at first to its outer side then for a short distance in front of it.

Post hinc has metatarsals
ant " " 2

Prominent Dorsalis Pedis

Branches { Tarsal, Metatarsal
Dorsalis hallucis
Communicating
Inter osseous ligaments



Ext. long digit

O — Ext. deep foot
in front

Ext. Prox. digit

To indicate the art. tibialis draw a line from the head of fibula to middle of ankle joint. 328

and then again to its outer side.

— Branches—

The branches of the anterior tibial artery are muscular, a recurrent branch which ascends to the front of the knee through the tibialis anterior muscle and two malleolar branches, external and internal, these surround the tibia just above the ankle joint and supply the joint.

— The Dorsalis Pedis Artery—

The dorsalis pedis artery is the continuation of the anterior tibial from the middle of the front of the ankle joint beneath the anterior annular ligament, along the inner side of the dorsum of the foot to the posterior extremity of the first interosseous space, where it terminates by dividing into two branches, communicating and dorsalis hallucis.

— Relations—

The dorsalis pedis has the same relations to muscles and cords as the lower third of the anterior tibial; to its inner side is the extensor proprius pollicis tendon, to its outer side is the extensor longus digitorum tendon and near its termination it is crossed by the tendon of the extensor brevis digitorum to the great toe.

It lies between satellite veins and has the anterior tibial nerve to its outer side.

— Branches—

I. Tarsae - 4

The tarsae branch passes outward on the tarsus.

II. Metatarsae - 1

The metatarsae branch passes outward on the

I Int. carotid
low front. Parotid gland. Stylo glossus. }
" Pharynx }
Stylo hyoid lig.

Intentionally Pharynx, tonsil gland.

Behind Trans. process. (ant. (tub.) of the
3 upper cerv. vertebrae Sep. by the rectus cap.
ant. maj.

Relations to cords.

base of the metatarsal bones and receives the posterior perforating branches from the plantar arch. The metatarsa sends forward three branches called interosseous, which after receiving the anterior perforating branches of the plantar digital arteries, divide at the clefts of the toes to form collateral digital branches for the dorsal aspect of the 5th 4th & 3^d toes and outer side of the second toe.

III. Dorsalis Hallucis.

The dorsalis hallucis is one of the two terminal branches of the Dorsalis pedis and runs forward to divide and supply the dorsal collateral digital branches to the great toe and to the inner side of the second toe.

IV. Communicating.

The communicating passes through the first interosseous space to anastomose with the termination of the external plantar, giving off a branch the magna pollicis which passes forward and divides to form plantar collateral digital branches for the great toe and inner side of the second toe.

- The Internal Carotid Artery.

The internal carotid artery is one of the two terminal branches of the common carotid and begins where that artery bifurcates more or less on a level with the upper border of the thyroid cartilage and ascends on the front of the transverse processes of the three upper cervical vertebrae to the carotid foramen situated about the centre of the basilar face

O O eye

clitacum

Sup laryngeal ~~nerve~~

O Corpora Quad

9th Gloss Pharyngeal, ~~nerve~~

3rd nerve

Sup laryngeal nerve.
- ascending Pharynx art.

Styloid process separates the Ex + Int carotids.

Tonsil gland is in front of Arty.

of the petrous portion of the temporal bone then runs forward and inward along the carotid canal of the petrous bone then emerges at the apex of the petrous bone passes forward in the cavernous groove beside the sella. It then and lastly turns upward beside the anterior clinoid processes and divides into its four terminal branches anterior cerebral, middle cerebral, posterior communicating and anterior choroid-

- Relations -

Its relations to muscles and structures other than cords are as follows.

Behind it are the transverse processes (their anterior tubercles) of the three upper cervical vertebrae being separated from them however by the origin of a muscle - *(The prevertebral muscles & the suboccipital muscles)*

In front of it and separating it from the second and third portions of the external carotid artery are the parotid gland the stylo-glossus and stylo-pharyngeus muscles and stylo-hyoid ligament. To its inner side are situated the pharynx and the tonsil gland - *(in 1 1/2 inches is in front)*

Its relations to cords are as follows:-

At its commencement it lies external to the external carotid artery but by the time that the external carotid has reached the posterior belly of the digastric and the stylo-hyoid muscles the internal has gotten behind it and is thenceforward separated from it by the structures mentioned above and by the glossopharyngeal nerve.

Behind the internal carotid artery where it is

Int. Carotid

Commences at.

ends at.

Low front.

Skin, Sup. fascia deep fascia, parotid gland

Stylo glossus

" Pharyngeal sinus Glossopharyngeal nerve.

Behind

Rectus capitis anterior major, Sympathetic

Sup. laryngeal nerve. int. carotid

Internally

Pharynx

Sup. laryngeal nerve, ascending pharyngeal artery.

Tonsil.

Externally

Int. jugular vein. Pneumogastric nerve.

entering the carotid foramen is situated the jugular and anterior condyloid foramen and from these emerge the internal jugular vein, the pneumogastric, and the glossopharyngeal nerves; consequently these cords are here behind the artery but speedily get to the outer side as they descend. The internal jugular vein and pneumogastric nerve continue external to that artery throughout, but the glossopharyngeal and hypoglossal nerves cross over the front of the artery, the hypoglossal near the commencement of the artery, the glossopharyngeal higher up. The internal carotid artery is divided into four portions: the first portion extends from its origin to the carotid foramen and is also known as its cervical portion, the relations of this portion have been given above; the second portion or petrous portion is that part of the artery which lies in the carotid canal of the petrous bone; the third or cavernous portion extends from the apex of the petrous bone along beside the sella turcica in the cavernous sinus to the anterior clinoid process; the fourth or cerebral portion ascends beside the anterior clinoid process.

- Branches

The first portion gives off no branch.
The second portion produces ^{one} unimportant branch to the tympanic and called tympanic.
The third portion gives origin to three branches, two of these the arteriae receptaculi are unimportant being distributed to the cavernous sinus and dura mater but the third is an important branch,

4 spinal
acromy
nerv.
supply
for the arm

Ophthalmic Arty.
Branches.

- (1) Lachrymal arts
- (2) Supra Orbital
- [3+4] ant. & Post Ethmoidal
- (5) The Two Palpebral.
- (6) The Frontal. } terminal branches
- (7) The Nasal }
- (8) The Arteria centralis Retina
- (9) The muscular.
- (10) ciliary - (L & C) long. short. anterior.



the ophthalmic artery.

332

~~have not had~~
-The Ophthalmic Artery-

The ophthalmic artery springs from the internal carotid about the termination of its third portion and passes forward into the orbit through the optic foramen first lying below and external to the optic nerve it crosses to the inner side of the nerve and runs forward along the inner wall of the orbit to divide at the internal angle of the orbit into two branches, frontal and nasal.

-Branches-

The branches of the ophthalmic are ten-

(1) Lachrymal. (2) according to some the corner of

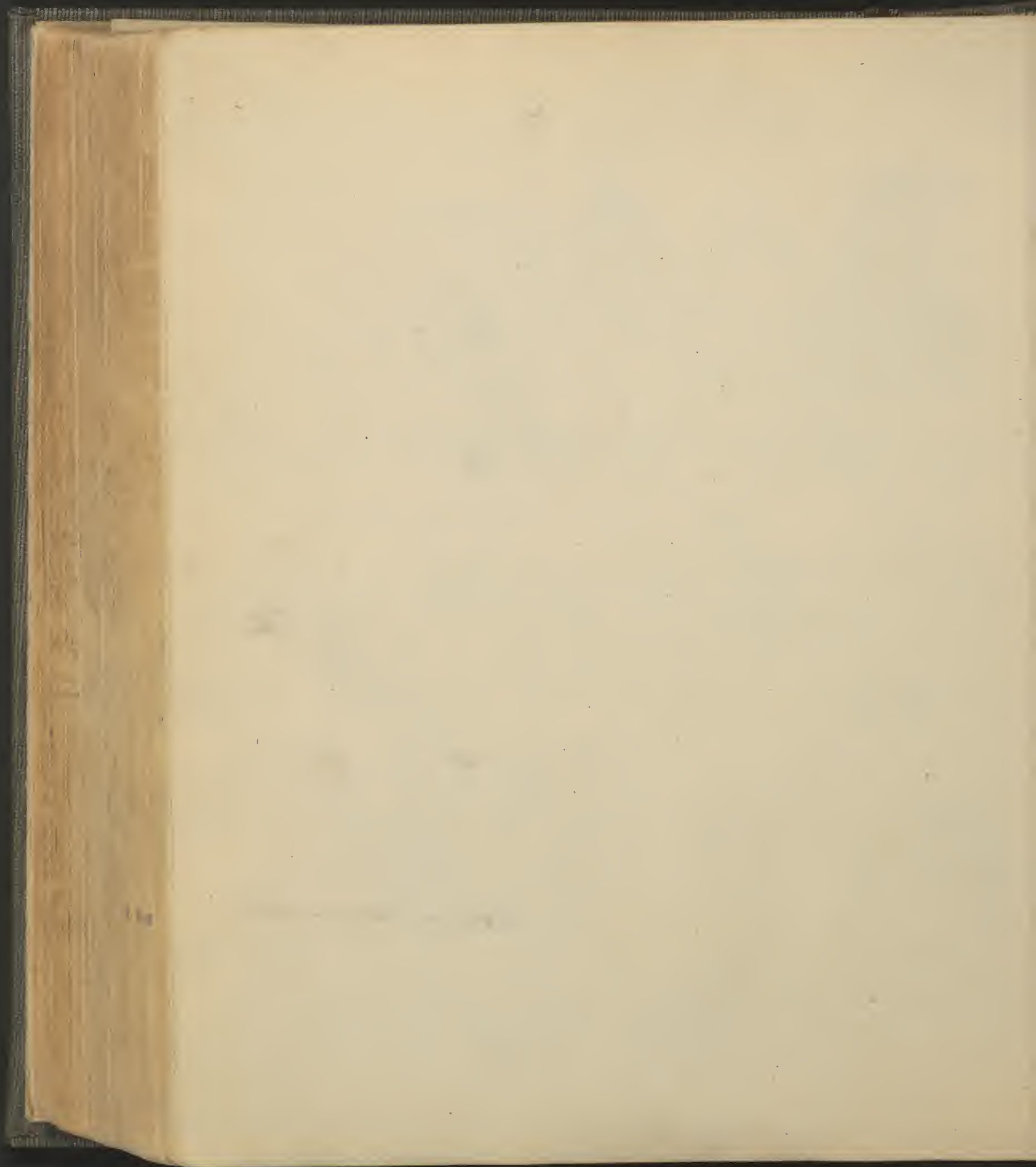
The lachrymal artery runs forward along the outer wall of the orbit and after supplying the lachrymal gland passes on to the upper eye-lid. It gives off temporo-malar branches which pass through the bone to the temporal muscle.

(2) Supra-orbital. (4)

The supra-orbital runs forward on the levator palpebrae muscle and escaping to the forehead through the supra-orbital foramen is there distributed by a superficial and a deep branch.

(3) & (4) Anterior & Posterior Ethmoidal.

The posterior and anterior ethmoidal arteries escape the one through the posterior ethmoidal foramen the other through the anterior and are distributed to the dura mater ethmoidal cells and nasal fossae.



(5). Palpebral - (7)

The two palpebral arteries, superior and inferior, arise from ophthalmic near its termination; the superior runs outward on the upper lid near its free border between the orbicularis palpebrarum and tarsal cartilage and is distributed; the inferior does the same for the lower lid; the two sometimes arise by a common trunk -

(6) Frontal - (9)

The frontal one of the two terminal branches of the ophthalmic artery emerges at the inner angle of the orbit and ascends to be distributed along the middle of the forehead -

(10)

(7) Nasal -

The nasal the other terminal branch of the ophthalmic artery emerges at the inner angle of the orbit and is distributed along the ridge of the nose.

(8) Arteria Centralis Retinae - (3)

The arteria centralis retinae pierces the optic nerve and runs forward in it to reach the retina and be there distributed -

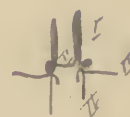
(9). Muscular - (2)

The ophthalmic artery gives off numerous muscular branches in its course and these may be divided into two sets, superior and inferior, the superior springing by one trunk and the inferior by another -

(10) Ciliary -

3+2 one below + 1 upper (2)

The ciliary arteries consist of three sets;
1st = short ciliary branches, are numerous small arteries early branches of short cill.



flows out & back.

teries which pierce the sclerotic around the optic nerve and supply the choroid-

2d Long ciliary arteries; which are two branches piercing the sclerotic on opposite sides and running forward between it and the choroid are distributed to the iris.

3d Anterior ciliary branches, are offsprings of the muscular branches and pierce the sclerotic near the front of the eye to reach the iris.

The branches, from the fourth or cerebral portion of the internal carotid are four.

Anterior Cerebral artery-

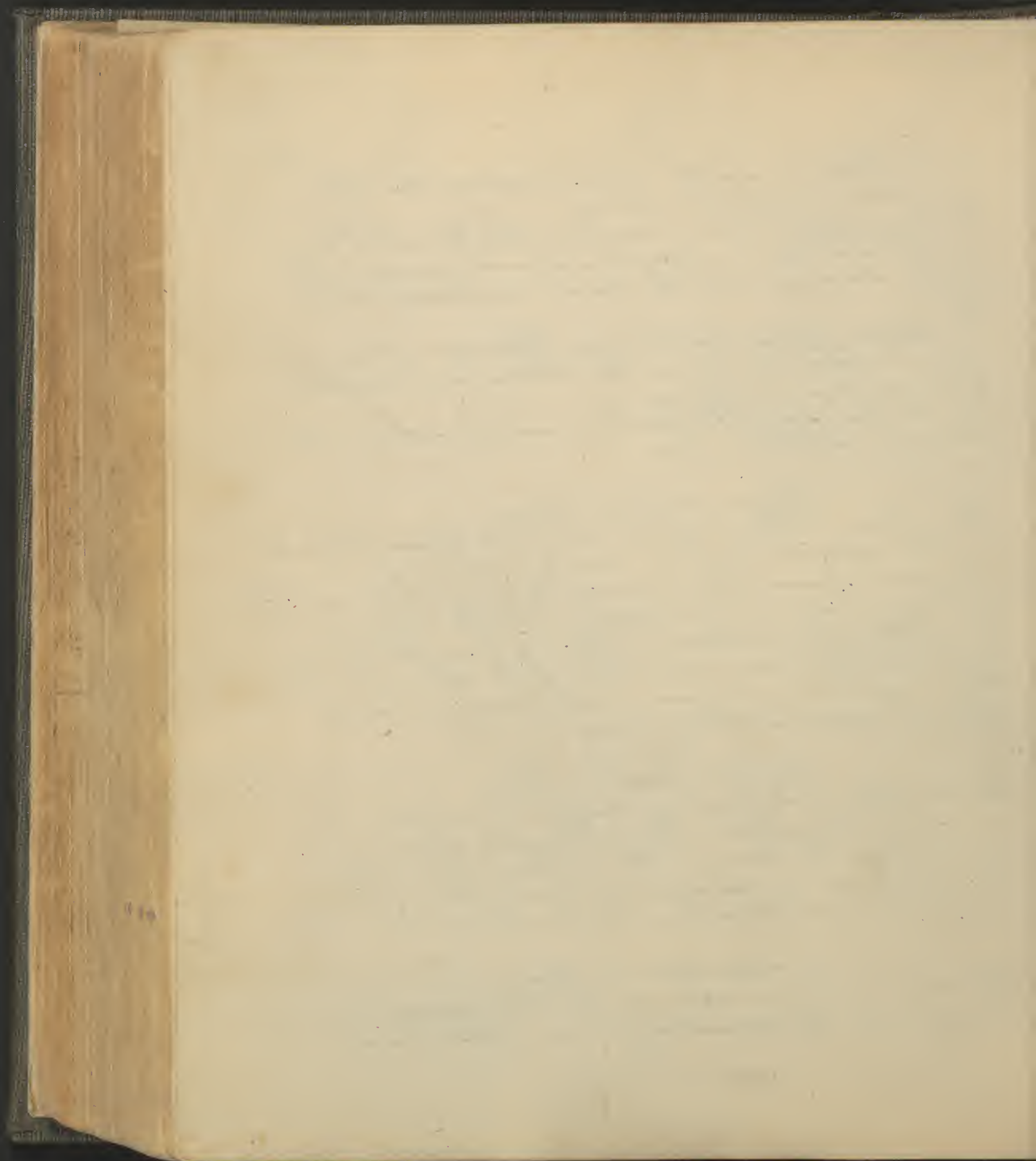
The anterior cerebral artery, one of the terminal branches of the internal carotid runs forward in the longitudinal fissure then ascends the genu of the corpus callosum and runs backwards along the upper surface of the corpus callosum. Passing from the anterior cerebral artery of one side to that of the other soon after their origin is a communicating branch called the anterior communicating artery.

Middle Cerebral Artery - a Cerebral artery

The middle cerebral artery arising as one of the terminal branches of the internal carotid passes outward along the fissure of the Sylvius to be distributed to the anterior and middle lobes of the cerebrum and to the convolutions forming the island of Reil.

Anterior Choroid Artery-

The anterior choroid artery pierces the base of the brain to enter the descending cornu of the lateral



ventricle and form the chord plexus-

335

Posterior Communicating Artery-

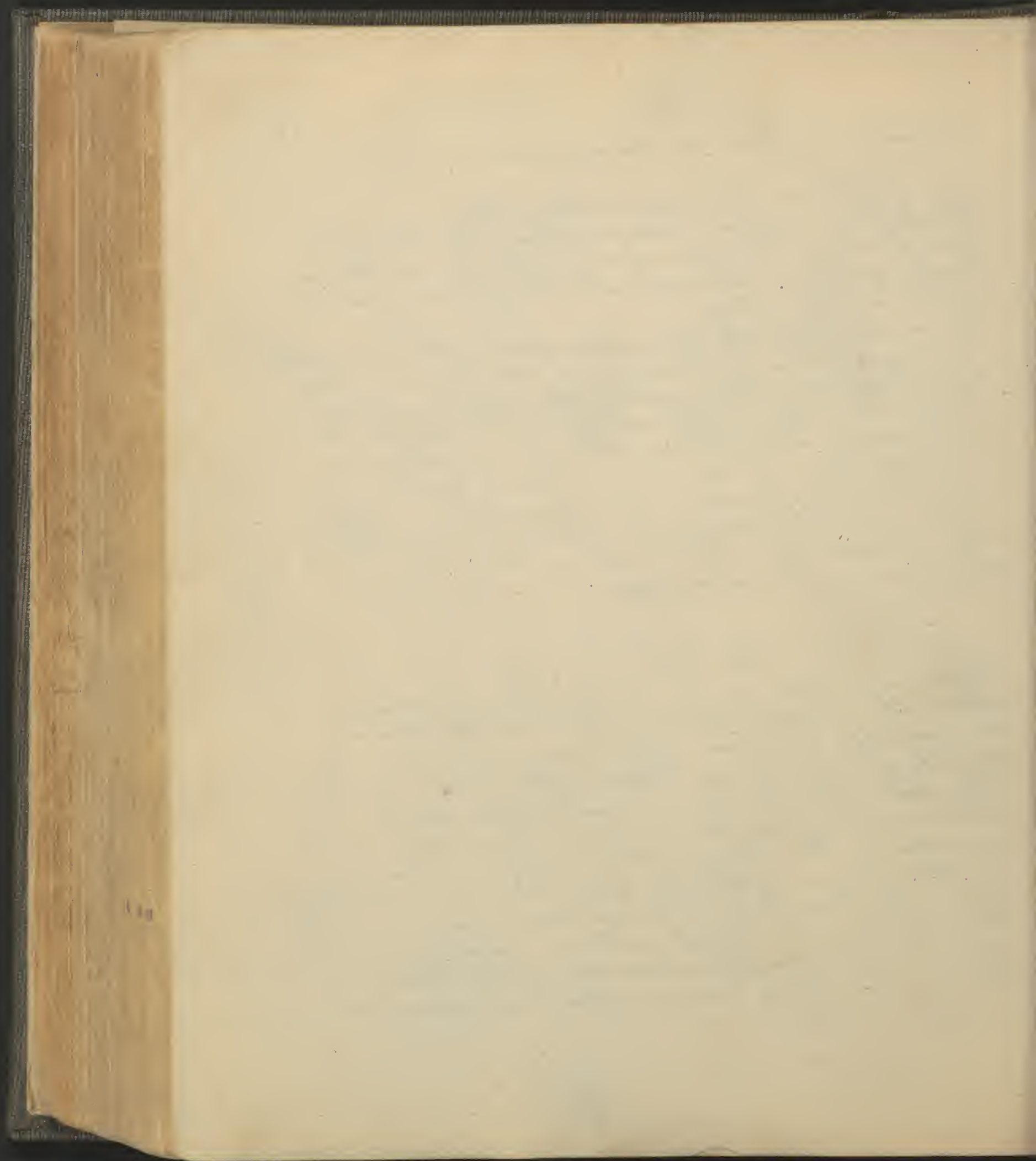
The posterior communicating artery, the last of the four terminal branches of the internal carotid passes backward to anastomose with the posterior cerebral of the basilar artery-

Circumscribing the air sided space of the base of the brain is a series of arteries and their communications forming what is called the vascular circle of Willis; thus beginning in front, is the anterior communicating and following the arteries back on one side they come in this order, anterior cerebral, internal carotid, posterior communicating, posterior cerebral and the termination of the basilar, following them forward from the basilar on the other side they come in the reverse order-

335
25-6
1/8

The Veins

The veins are the vessels which return the blood which the arteries have carried to the capillaries, consequently the course of the venous current is the opposite of arterial, viz. towards the heart into which they open after having converged to two trunks, superior and inferior vena cavae. The veins as a rule accompany the arteries either singly or in pairs as satellite veins and the size of the vein or veins which return the blood from a given part is much greater than that of the artery or arteries supplying that part. But it must be observed in the extremities there are two sets of veins a superficial set which



course just beneath the skin in the superficial fascia and a deep set the satellite veins so that here the veins accompanying the arteries are remarkably small, especially in the upper extremity where the superficial are long and numerous. Still ultimately after a longer or shorter course the two sets coalesce. The companion vein of an artery as a rule receives accessions corresponding to the branches emitted by its artery, though to this there are some notable exceptions -

- The Veins of the Lower Extremity -

The veins of the lower extremity consist of two sets the superficial and deep or satellite.

Beginning then with the satellite veins we find that those of the posterior tibial artery have been formed where that artery terminates by the coalescence of the four satellite veins of the two plantar arteries, and ascend receiving tributaries in correspondence with the branches of the artery until they reach the point where the popliteal artery terminates and there unite with the satellite veins of the anterior tibial artery to form the popliteal vein.

The satellite veins of the anterior tibial artery are the continuation of those of the dorsalis pedis and ascending and giving off accessions corresponding to the branches of the artery they terminate by coalescing with the posterior tibial veins to form the popliteal vein. The Popliteal vein thus formed lies at first to the inner side of its artery but as it ascends it crosses superficially to the outer side and there remains to where it terminates at the lower third of the thigh by becoming the femoral. The pop-

femoral operation at about the junction with
middle and lower third of the thigh, by the
femoral artery (aductor magnus)

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Note that about the same as before - the
necrosis and being in position of rest.

liteal vein receives not only tributaries corresponding to the branches of the popliteal artery, but also one of the superficial veins called the short saphenous.

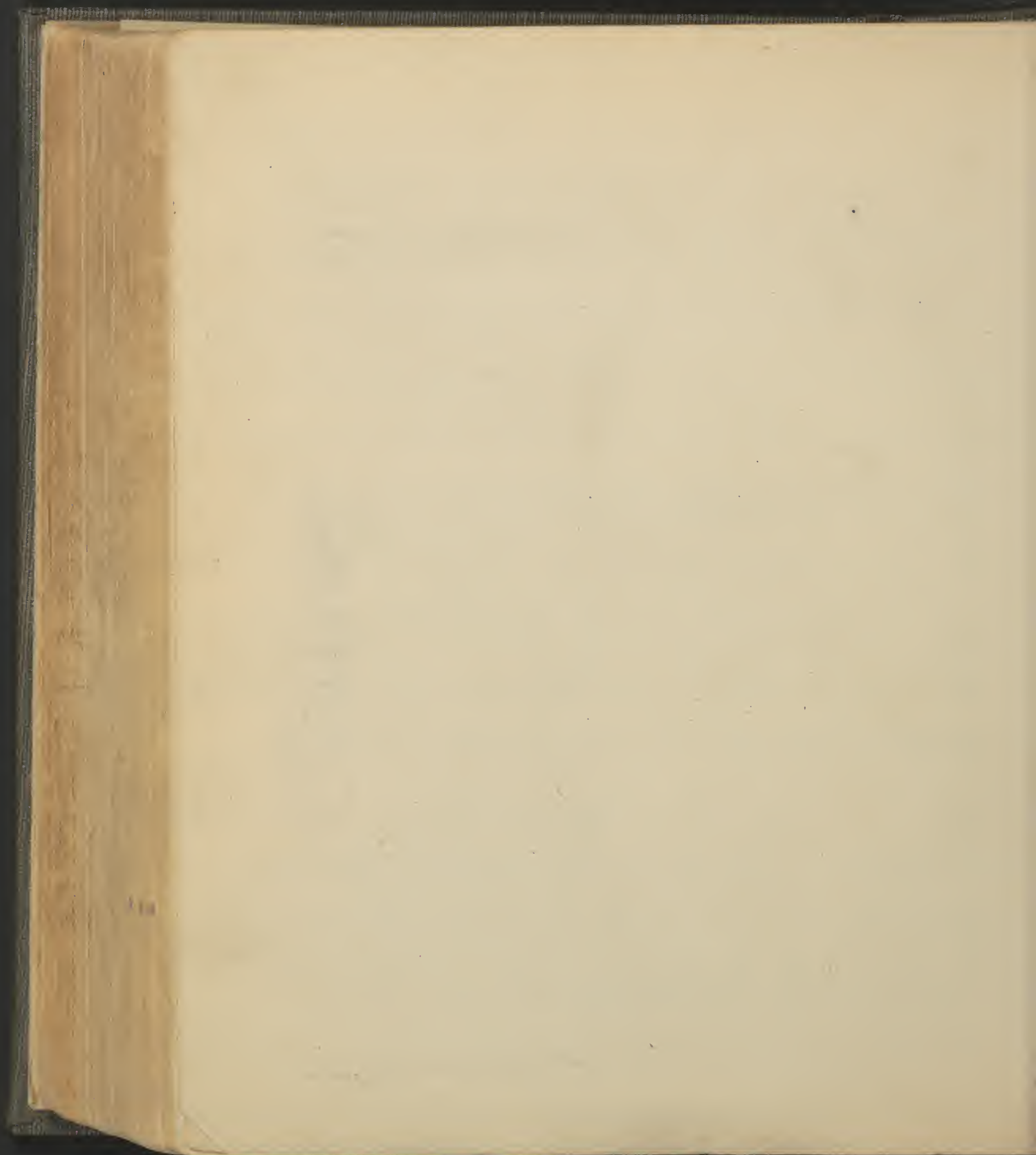
The Femoral vein the continuation of the popliteal commencing where that vein ceases at the opening in the adductor magnus muscle for the femoral artery(?) ascends in company with its artery lying at first external, then behind and finally internal to it and terminates by becoming the external iliac vein at the same point where the femoral artery commences.

The femoral vein receives accessions as it advances corresponding to the branches of its artery and also the second of the two superficial veins, the long saphenous which opens into it just below Poupart's ligament. Thus, it is seen that from the commencement of the femoral artery to the termination of the popliteal the artery of the lower extremity is accompanied by but one vein.

The Superficial Veins of the lower Extremity - The superficial veins of the lower extremity consist of two kinds called external and internal or shorter and long saphenous.

- Short Saphenous Vein -

The short saphenous vein begins on the outer side of the dorsum of the foot, ascends behind the external malleolus and with an inclination inward gains the groove between the two bellies of the gastrocnemius muscle and continues its course upward to open into the popliteal vein, having received numerous accessions on its course.



- Long Saphenous Vein -

The long saphenous vein commences on the inner side of the dorsum of the foot ^{at angle arch 92} and ascends in front of the internal malleolus behind the inner condyle of the femur and then after ascending the inner side of the thigh for some distance inclines to the front and just below Poupard's ligament pierces the fascia lata and opens into the femoral vein gathering as it runs tribute from many smaller superficial veins and receiving just as it is about to terminate the veins of the four first branches of the femoral artery.

- External Iliac Vein -

The external iliac vein is the continuation of the femoral from Poupard's ligament upward and inward along the brim of the pelvis to unite with the internal iliac vein on the disk between the 5th lumbar vertebra and base of the sacrum to form the common iliac vein - It receives accessions corresponding to the two branches of the external iliac artery epigastric and circumflex iliac -

The two external iliac veins bear different relations. The vein of the left side is internal to its artery. The right vein is first internal then behind and then behind and external.

- The Internal Iliac Vein -

The internal iliac vein is formed by the coalescence of the veins accompanying the branches of the internal iliac artery, the veins of the visceral branches are so numerous and intersecting that they form plexuses - The vein thus formed ascends behind



its artery and unites with the external iliac vein on the disk between the 5th lumbar vertebra and sacrum to produce the common iliac vein.

-The Common Iliac Vein-

The common iliac vein is the result of the union of the external and internal iliac veins at the base of the pelvis on the disk between the 5th lumbar vertebra and sacrum and passes upward and inward to unite with its fellow of the opposite on the right side of the disk between the 4th & 5th lumbar vertebrae to form the inferior vena cava. The average length of the vein is two inches though the vein of the left side is the longer. The relation of each vein to its artery is as follows.

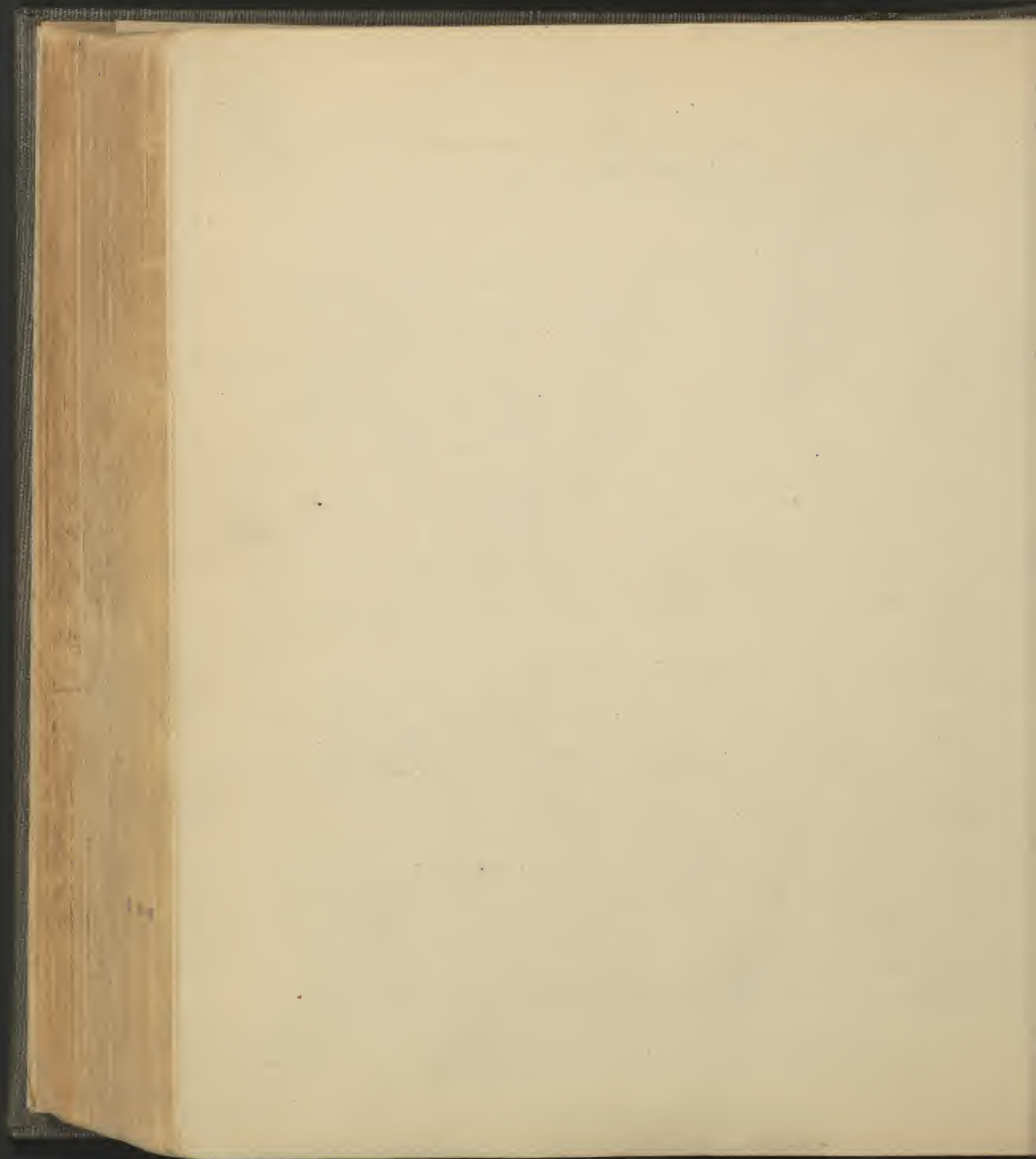
The left vein is behind and internal to its own artery and crosses behind the right artery.

The right vein is behind and external to its artery.

The Inferior Vena Cava-

The inferior vena cava begins by the union of the two common iliac veins on the right side of the disk between the 4th & 5th lumbar vertebrae and ascending to the right of the abdominal aorta perforates the diaphragm and opens into the right auricle.

The inferior vena cava receives tributaries corresponding to only some of the branches of the aorta it is true that it eventually receives all the blood circulating through those arteries but not from accompanying veins of all of them for the veins corresponding to the arteries distributed to the organs of digestion coalesce into a trunk the portal vein which discharges



ex itself into capillaries of the liver and from these the blood is gathered by the hepatic veins and by them discharged at the posterior border of the liver into the inferior vena cava.

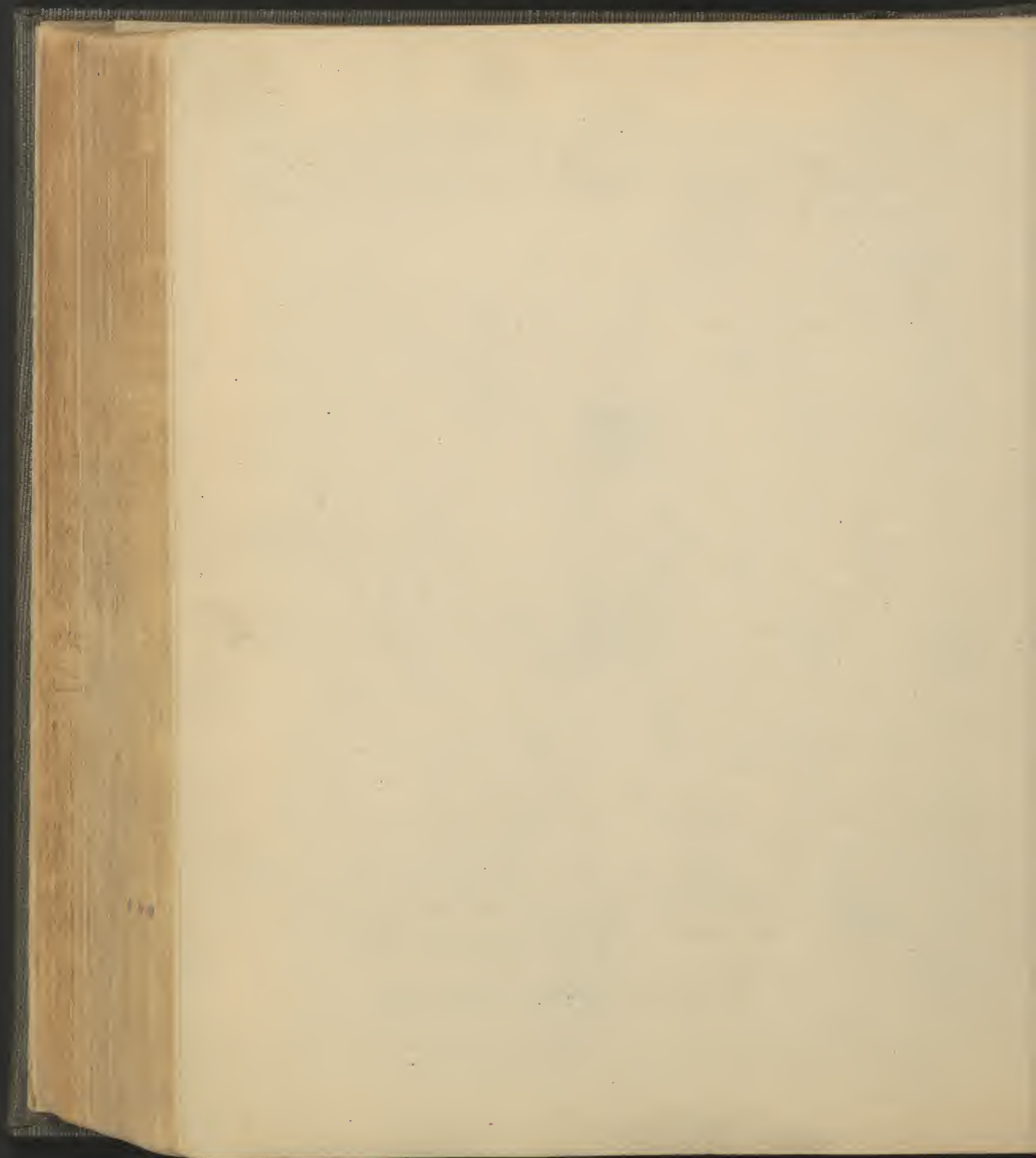
The Portal Vein-

The portal vein is formed by the union of the superior mesenteric and splenic veins behind the head of the pancreas and ascends in the right border of the lesser omentum between and behind the hepatic artery and duct to the transverse fissure of the liver where it divides into a branch for each of the two lobes of the liver, being about four inches long. Now although the portal vein is formed directly by the union of the superior mesenteric and splenic veins still it conveys the blood from the inferior mesenteric vein and the gastric vein for these two open into the splenic vein. He stated the blood carried to the liver by the portal vein is collected by the hepatic veins which emerge by 3 or 4 apertures on the posterior border of the liver and open into the inferior vena cava.

The Spermatic Vein-

The spermatic vein begins in the testicle by a plexus which ascends as numerous small veins along the spermatic cord to the external abdominal ring, where uniting into two veins these pass upward and inward and soon unite to form a single vein, the vein of the right side opening into the inferior vena cava and the left vein into the left renal vein having been crossed by the sigmoid flexure.

The Veins of the Upper Extremity-



The veins of the upper extremity comprise two sets the superficial and deep-

-The Deep Veins-

The deep or satellite veins of the upper extremity are remarkably small owing to the great amount of blood flowing through the superficial veins-

The satellite veins of the radial and ulnar arteries formed by the coalescence of the veins of the branches of those arteries, unite to produce the satellite veins of the brachial artery a finger's breadth below the middle of the front of the elbow. The brachial satellite veins, having collected the blood from the veins of the branches of the brachial artery unite where the axillary artery terminates to form the axillary vein which passes upward and inward lying to the inner front aspect of its artery to cease at the lower border of the clavicle by becoming the subclavian vein having received accessions in correspondence with the branches of the axillary artery-

-The Superficial Veins-

The superficial veins of the upper extremity are seven-

-- Anterior Ulnar -

The anterior ulnar vein begins on the inner side of the front of the fore-arm and ascends to unite with the posterior ulnar vein just below the elbow.

-- Posterior Ulnar -

The posterior ulnar vein passes up the inner side



of the back of the fore-arm to turn forward and unite with the anterior ulnar just below the elbow to form the common ulnar vein.

— The common Ulnar —

The common ulnar vein ascends to the inner side of the front of the elbow to unite with another vein the median basilic and form the basilic vein.

— Radial —

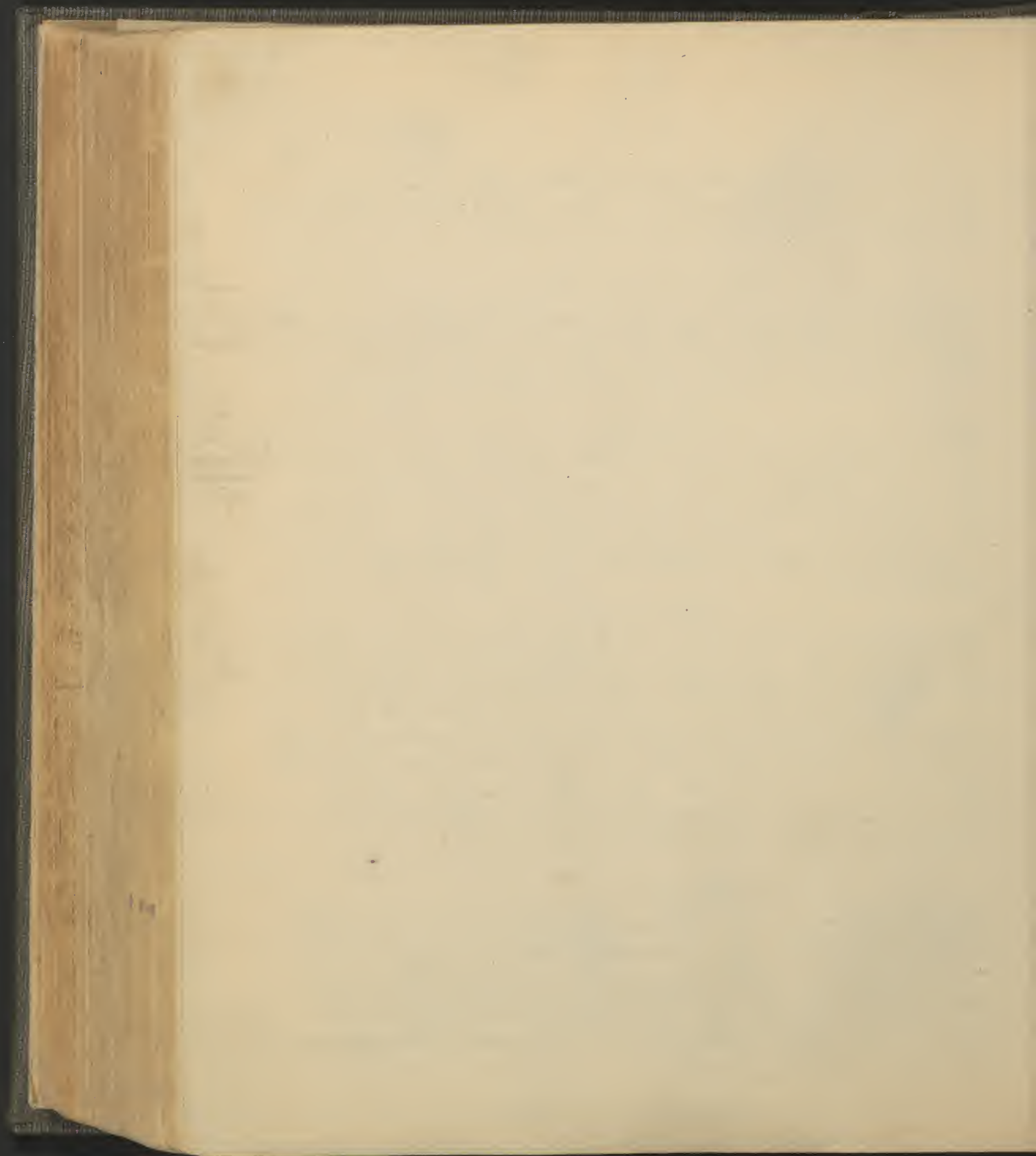
The radial vein commences on the outer side of the back of the hand and ascends with an inclination forward and inward to terminate at the outer side of the front of the elbow by uniting with the median cephalic vein to form the cephalic vein.

— Median —

The median vein ascends along the middle of the front of the fore-arm from the hand to a little below the front of the elbow where it divides into two veins one, the median- cephalic passes upward and outward to unite with the radial vein and form the cephalic vein while the other the median- basilic passes upward and inward to join the common ulnar vein and form the basilic vein.

— Basilic —

The basilic vein commences at the inner side of the front of the elbow by a union of the common ulnar and median basilic veins, and ascends the inner side of the arm lying to the inner side of the brachial artery, first superficial to it and then pierces



the deep fascia to reach the level of the artery and where the satellite veins of the brachial unite it coalesces with them to produce the axillary vein -

- Cephalic -

The cephalic vein begins at the outer side of the front of the elbow being formed by the union of the median- cephalic and radial veins and ascends the arm skirting the outer edge of the biceps muscle then lying in the interval between the Deltoid and pectoralis major it terminates in the axillary vein near its termination - The cephalic vein receives a communication near its termination which passes over the clavicle from a vein of the neck, external jugular -

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just above
flange

with
venous
artery.

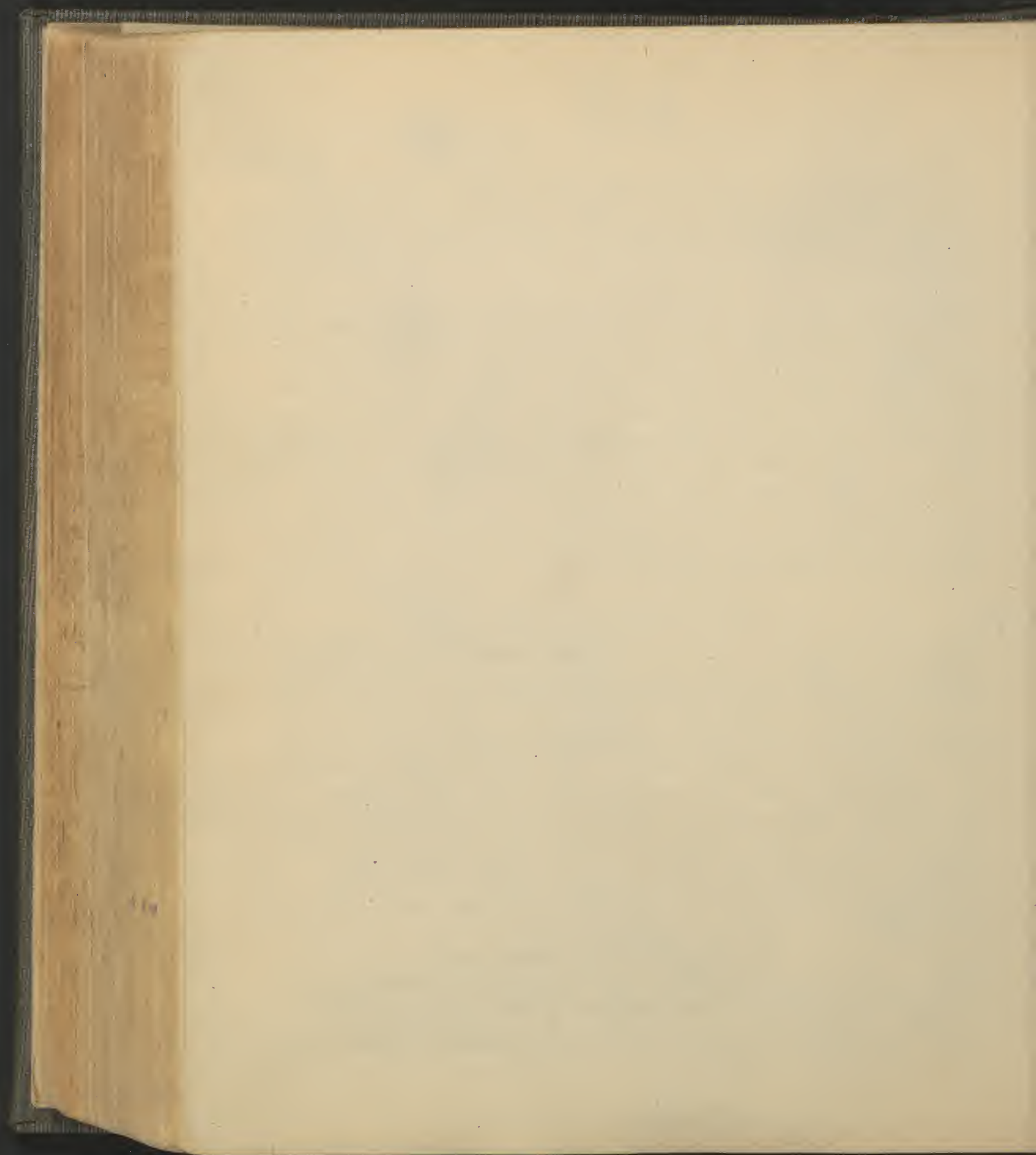
- The Subclavian Vein -

The subclavian vein is the continuation of the axillary; it passes horizontally inward behind the clavicle to unite just behind the sterno-clavicular articulation with the internal jugular vein and form the vena innominata - The subclavian vein is in relation with its artery only where the artery terminates, there lying internal and where the artery begins there lying below or external intermediate between these points the vein is below the artery and separated from it by the scalenus anticus muscle -

N.B.

- The Right Vena Innominata

The right vena innominata begins behind the right sterno-clavicular articulation by the union of the right subclavian and internal jugular veins and



descends nearly perpendicularly to unite with the left vena innominata to form the superior vena cava being about $1\frac{1}{4}$ in long, lying external to the arteria innominata.

-The Left Vena Innominata-

The left vena innominata, or great transverse vein, is formed behind the left sternoclavicular articulation by the junction of the left subclavian and internal jugular veins and passes almost horizontally to the right lying upon the arch of the aorta and in front of the origins of the three arteries springing therefrom and unites with the right vena innominata to form the superior vena cava - The vena innominata receives accessions corresponding to the branches of the subclavian artery except the veins accompanying the supra-scapular and transversa colli arteries which open into a superficial vein of the neck the external jugular and this shews into the subclavian vein.

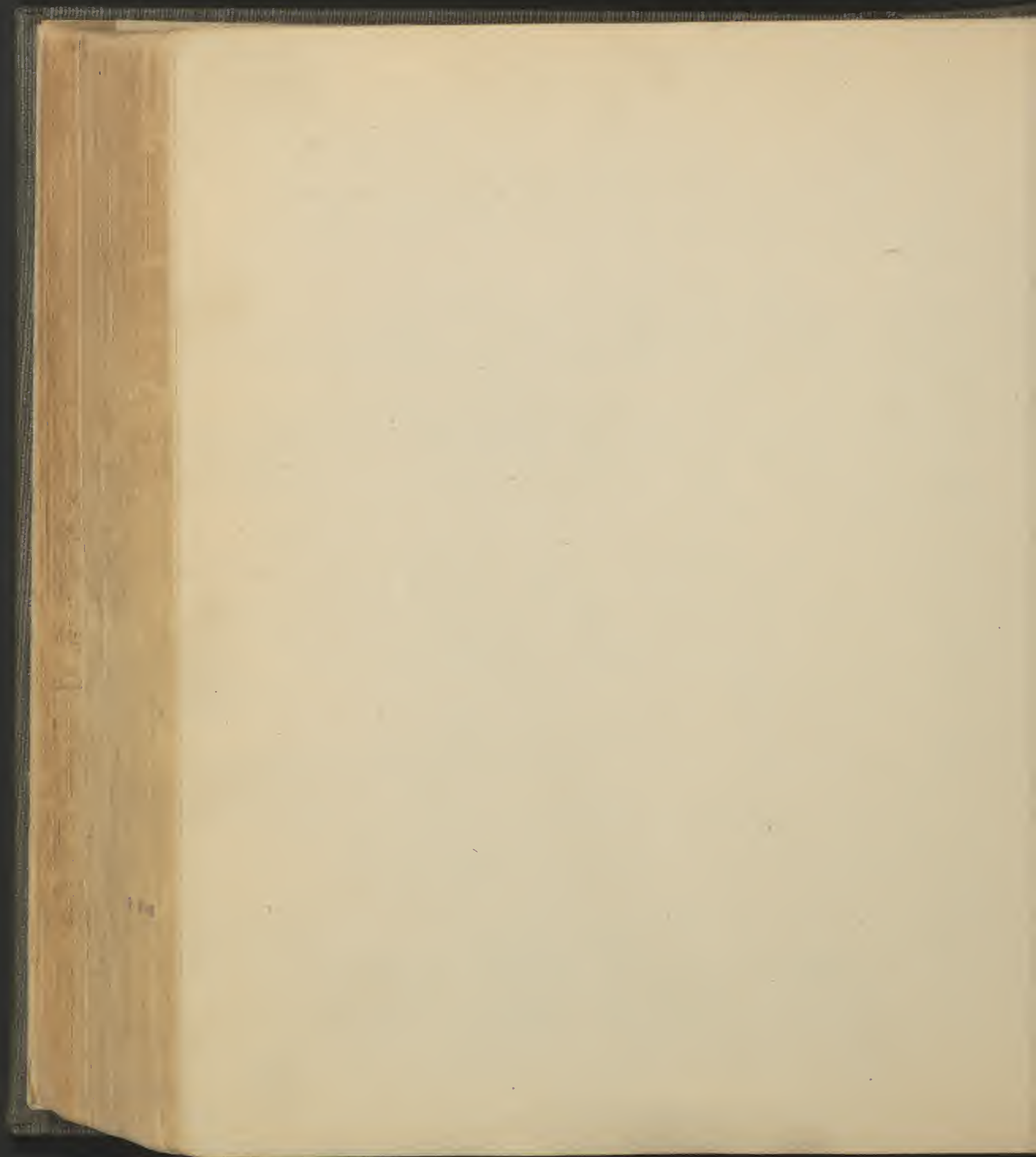
-The Superior Vena Cava-

The superior vena cava is formed at the lower border of the second costal cartilage of the right side by the confluence of the two venae innominatae and descends to the right of the ascending aorta for about three inches to open into the right auricle of the heart.

-The Azygos Veins-

The two azygos veins, right and left, are a means of communication between the two venae cavae.

-Right Vena Azygos-



The right vena azygos begins in the right lumbar region by a communication with one of the lumbar veins or the renal vein or even the inferior vena cava itself and ascends along the front of the vertebral column through the aortic opening of the diaphragm to the right of the descending aorta until it reaches the 3^d dorsal vertebra, where it arches forward over the right bronchus and opens into the superior vena cava. It receives the right intercostal veins as far up as it extends and also the left vena azygos.

-The Left Vena Azygos-

The left vena azygos begins in the left lumbar region in the same way as the right does and ascends, crossing the left end of the diaphragm and lying beside the vertebral column as high as the 6th dorsal vertebra where it crosses behind the aorta and opens into the right vena azygos. It receives the left intercostal veins as high up as it extends. The intercostal veins of each side which lie above the termination of the vena azygos open into a vein called the right or left superior intercostal; the right superior intercostal opens into the right subclavian vein the left superior intercostal vein opens into the left vena innominata.

-The Veins of the Head and Neck-

The veins of the head and neck comprise three veins called, jugular, external, internal and axillary and their formative branches.

-The Internal Jugular Vein-

The internal jugular vein begins at the foramen la.

commences at the termination of lateral rivers.

common posterior by the convergence of the blood from the interior of the cranium and descends the neck lying first behind then external to the common carotid artery to terminate behind the sterno-clavicular articulation by uniting with the subclavian vein to form the vena innominata of that side. } }

It receives nearly all the blood returned from the ramifications of the external carotid artery the veins converging this blood may be thus described - The temporal and internal maxillary veins having collected the blood from the distribution of their arteries coalesce in the parotid gland to form a common trunk called the temporo-maxillary, which after descending a short distance divides into two branches, one mounting over the sterno-mastoid muscle to become the external jugular vein and the other opening into the facial vein; the facial vein begins on the forehead under the name of the frontal vein this descends near the centre of the forehead to the internal angle of the eye where it is called the internal angular vein and then downward with the facial artery taking thence the name of facial; soon after reaching the neck it is joined by a branch of the temporo-maxillary vein and then opens into the internal jugular vein about on a level with the upper border of the thyroid cartilage - It sometimes receives the lingual vein and the superior thyroid vein though usually these open into the Internal jugular vein.

- The External Jugular Vein - ✓

The external jugular vein commences in the parotid as a branch of the temporo-maxillary vein which

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Some times erupt. its self into int. gang.

is joined by the posterior auricular vein and sometimes by the occipital and descends across the outer surface of the sterno-cleido-mastoid muscle and then along its posterior border to cross the third portion of the subclavian artery and opens into the subclavian vein. It receives just before terminating the axilla-ascapular and transversa colli veins and has a communication across the clavicle with the cephalic vein.

- The Anterior Jugular Vein -

The anterior jugular vein descends the front of the neck beside the middle line and just above the sternum turns outward beneath the sterno-cleido-mastoid muscle and opens into the subclavian vein. It is always small and sometimes inconspicuous.

- The Sinuses of the Dura Mater -

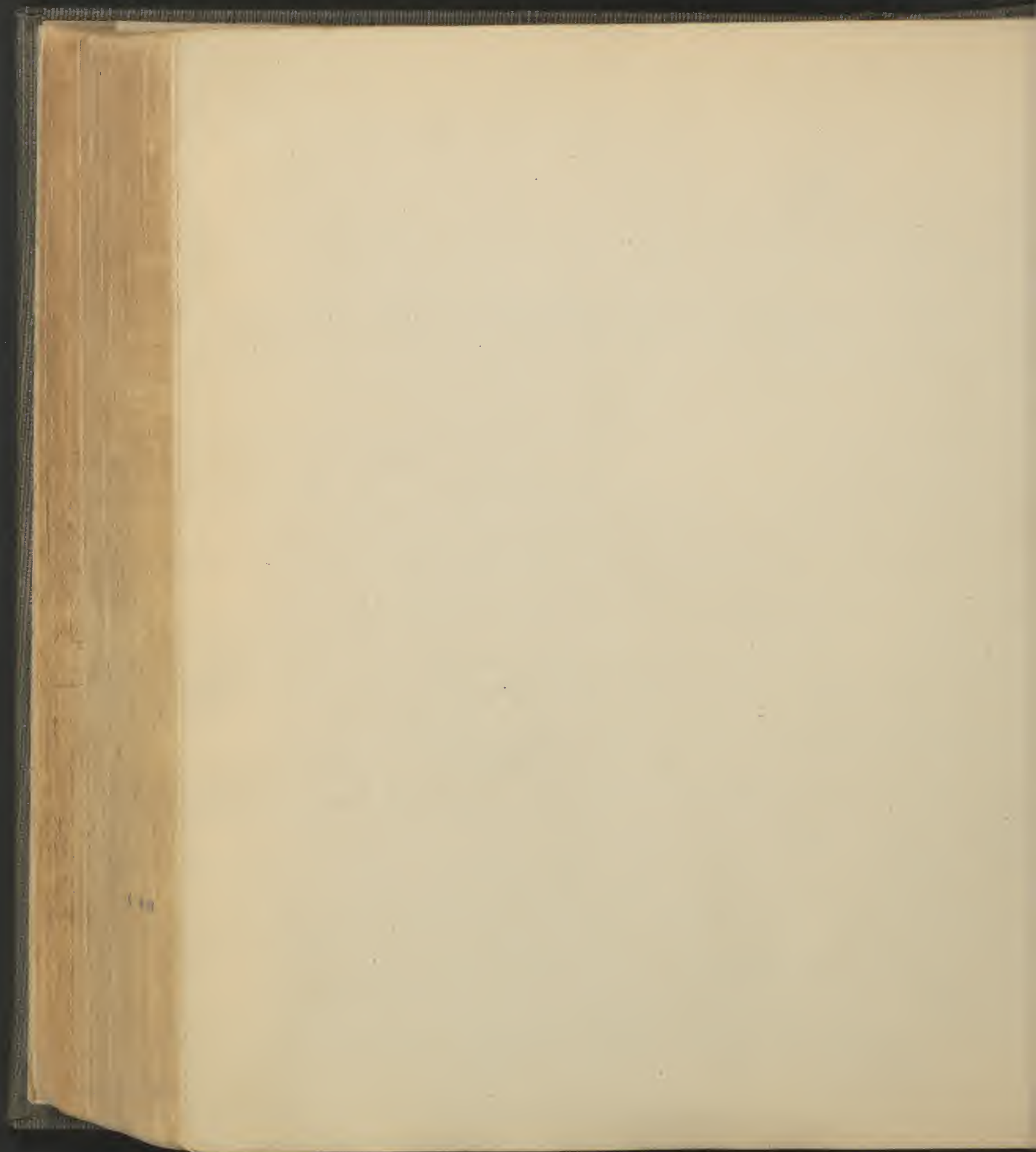
The veins which return the blood from the brain consist of three on the surface of the brain called the superficial cerebral, those of the interior of the brain and certain canals in the layers of the dura mater which receive the blood from the foregoing called sinuses.

- The superficial Cerebral Veins -

The superficial cerebral veins although they may be seen on the whole surface of the brain are especially long and numerous on the upper aspect; these veins open into the sinuses which are near them.

- Deep Cerebral Veins -

The blood from the interior of the brain is collected



by sinuses which ultimately coalesce into two (the venae
 cavae) which emerge beneath the posterior lobes of the
 cerebrum one on each side and open into a sinus of the
 tentorium, the straight.

—The Sinuses of the Dura Mater—

The sinuses of the duramater are nine as follows—

—Superior Longitudinal Sinus—

The superior longitudinal sinus is found running
 from before backward in the attached margin of the
 falx major; beginning in front at the foramen cecum
 it passes backward, covering the vault of the cranium
 to terminate at the anterior occipital protuberance
 by dividing into the two lateral sinuses. It receives
 the superior superficial veins which open into it
 from behind forward.

—The Lateral Sinus—

The lateral sinus begins at the anterior occipital pro-
 tuberance and passes outward along the horizontal
 limb of the occipital cross then curves downward over
 the inferior posterior angle of the parietal bone the
 mastoid portion of the temporal bone and again on
 the occipital bone to terminate in the jugular vein at
 the posterior foramen lacernum, the position of the
 lateral sinus is indicated in the dried bone by a
 groove.

—The Occipital sinuses—

The occipital are two small sinuses which commence
 around the foramen magnum and ascend in the
 attached margin of the falx minor to open at the
 anterior occipital protuberance into the commence-
 ment of the lateral sinuses.

Handwritten text, likely bleed-through from the reverse side of the page. The text is faint and appears to be a list or a series of notes, possibly related to a botanical or scientific study. The handwriting is cursive and somewhat illegible due to fading.

- Inferior Longitudinal Sinus -

The inferior longitudinal sinus is a small and unimportant; it runs backward in the lower free concave edge of the falx major to terminate when it reaches the tentorium in the straight sinus -

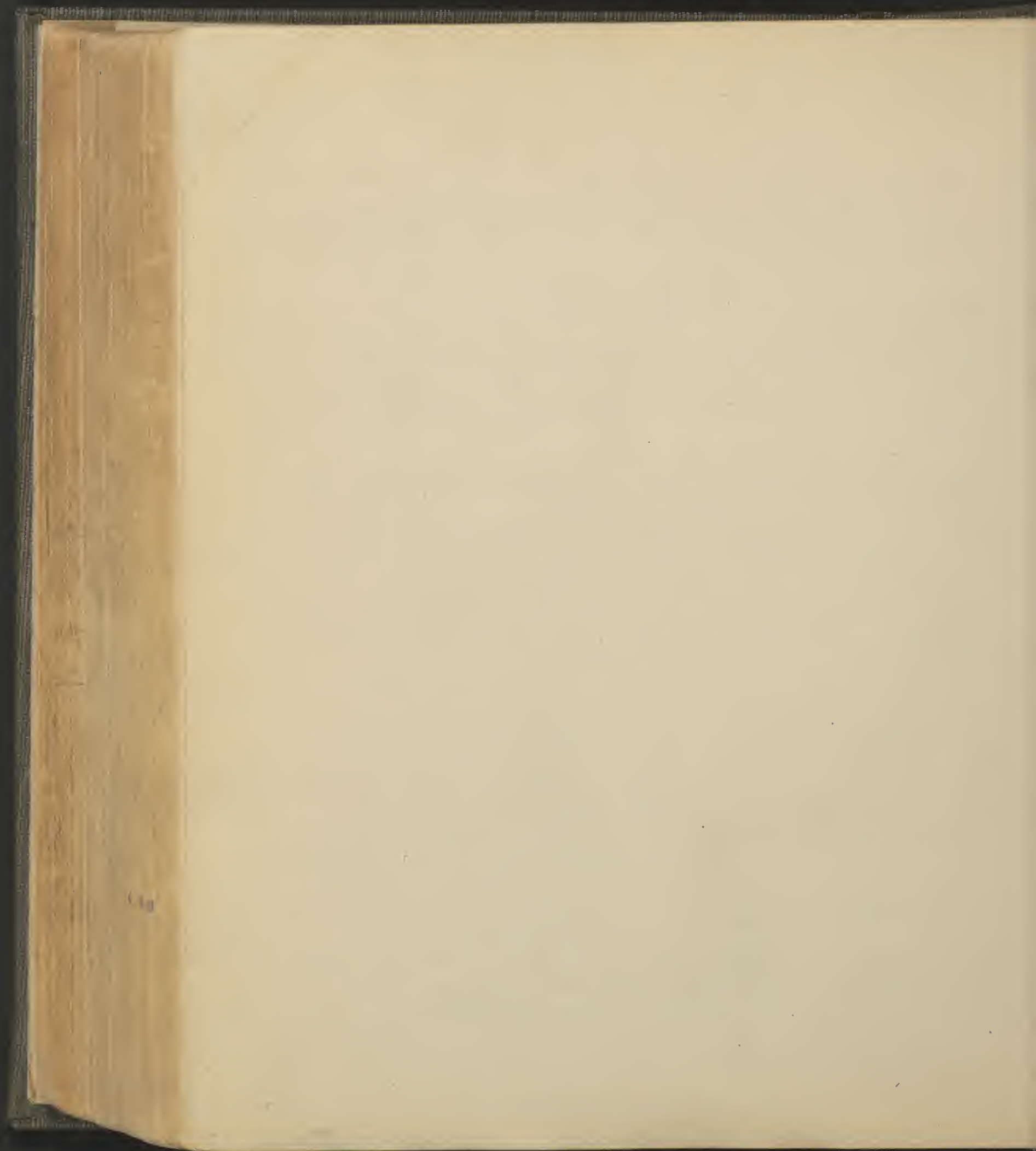
- The Straight Sinus -

The straight sinus triangular in shape runs horizontally backward along the centre of the upper surface of the tentorium between the layers of the falx major to terminate at the anterior occipital protuberance -

It is thus seen that four sinuses superior longitudinal, straight and two occipital, convey their tide to the anterior occipital protuberance and that the blood is removed from this point by the two lateral sinuses, hence this place is called the Foramen He-
rophili - The sinuses above described are found at the upper and back part of the brain but there are others situated at the base as follows -

- The Cavernous Sinus -

The cavernous sinus occupies the groove at either side of the sella turcica, commencing in front by receiving the ophthalmic vein it passes backward to terminate at the apex of the petrous bone by dividing into two, superior and inferior petrosal - Passing through the cavernous sinus from behind forward are the internal carotid artery and several nerves - The sinuses of the two sides are connected by transverse communications, one in front and one behind across the sella turcica thus forming an arrangement called the circular sinus or sinus of Pedley -



- The Superior Petrosal Sinus -

The superior petrosal sinus passes outward and backward along the upper border of the petrous bone - its open into the lateral sinus just where it curves downward -

- The Inferior Petrosal Sinus -

The inferior petrosal sinus passes backward and outward along the (lower) posterior border of the petrous bone to terminate with the lateral sinus at the posterior foramen lacerum to form the internal jugular vein -

- The Transverse Sinus -

The transverse sinus consists of one or more channels of communication across the basilar process between the two inferior petrosal sinuses -

- The Veins of the Diploë -

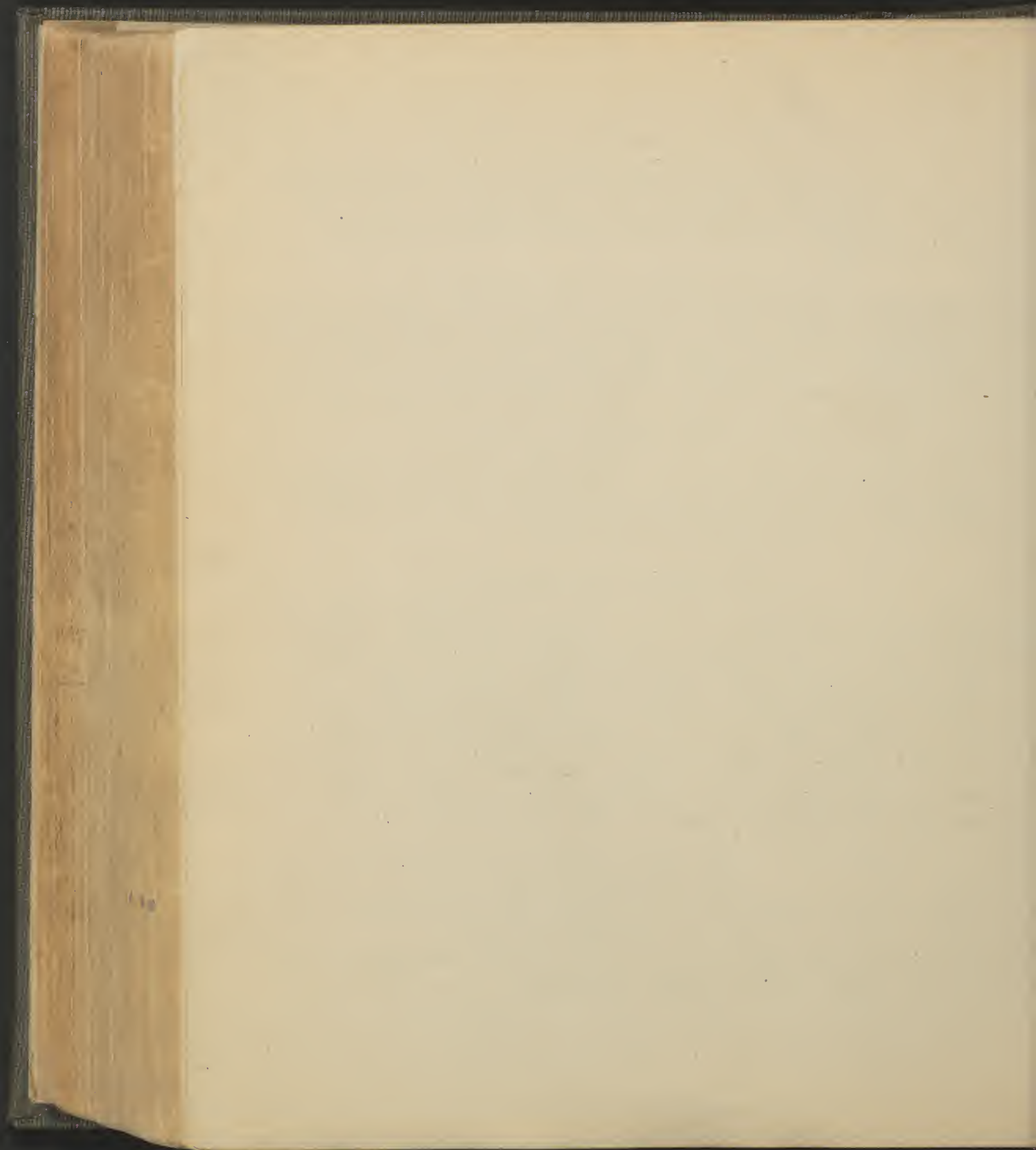
Ramifying between the tables of the bones of the skull are numerous veins called diploetic - They take the name of the region they occupy and finally converging to four trunks these open either into the sinuses of the interior or the veins of the exterior - Connecting the sinuses of the interior with the veins of the exterior of the head are several veins (called emissary) which pass through foramina as the mastoid and parietal.

- The Spinal Veins -

The spinal veins consist of three sets as follows -

- Dorsal spinal Veins -

The dorsal spinal are numerous veins forming a network on the exterior of the vertebrae -



- Meningo-rachidian Veins -

The meningo-rachidian are four veins perpendicular in direction which lie within the spinal canal between the bone and dura mater, two being in front and two behind.

- Medulli-spinal Veins -

The medulli-spinal are numerous veins ramifying beneath the arachnoid membrane of the spinal cord.

- The Cardiac Veins -

The veins of the heart are two as follows:

The Great Cardiac Vein -

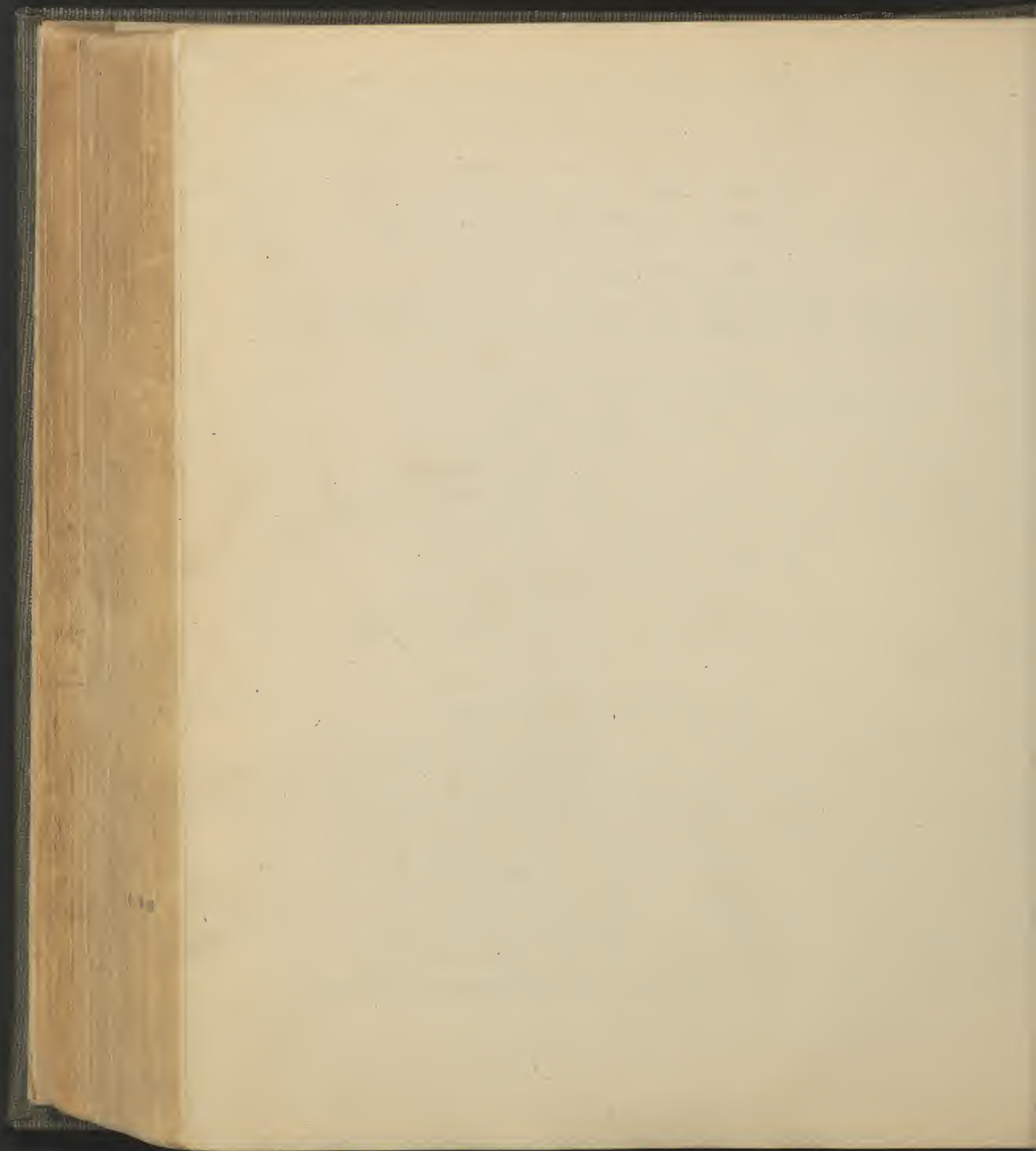
The great cardiac vein ascends in the anterior ventricular groove winds around the left auriculo-ventricular groove and opens into the right auricle, the last inch of its course is known as the coronary sinus.

- The Posterior Cardiac Vein -

The posterior cardiac vein is small and ascends in the posterior ventricular groove to open into the great cardiac vein.

- The Lymphatic System -

The lymphatic system consists of numerous small vessels ramifying in nearly every tissue of the body and of reddish pea-like bodies lymphatic glands found at intervals along the course of the lymphatic vessels. The lymphatic vessels are intended for the most part to remove from the tissues the detritus of assimilation consisting chiefly of suspended plasma, consequently the course of their circulation is from the circumference towards the centre and on their route they will be found accompanying the veins.



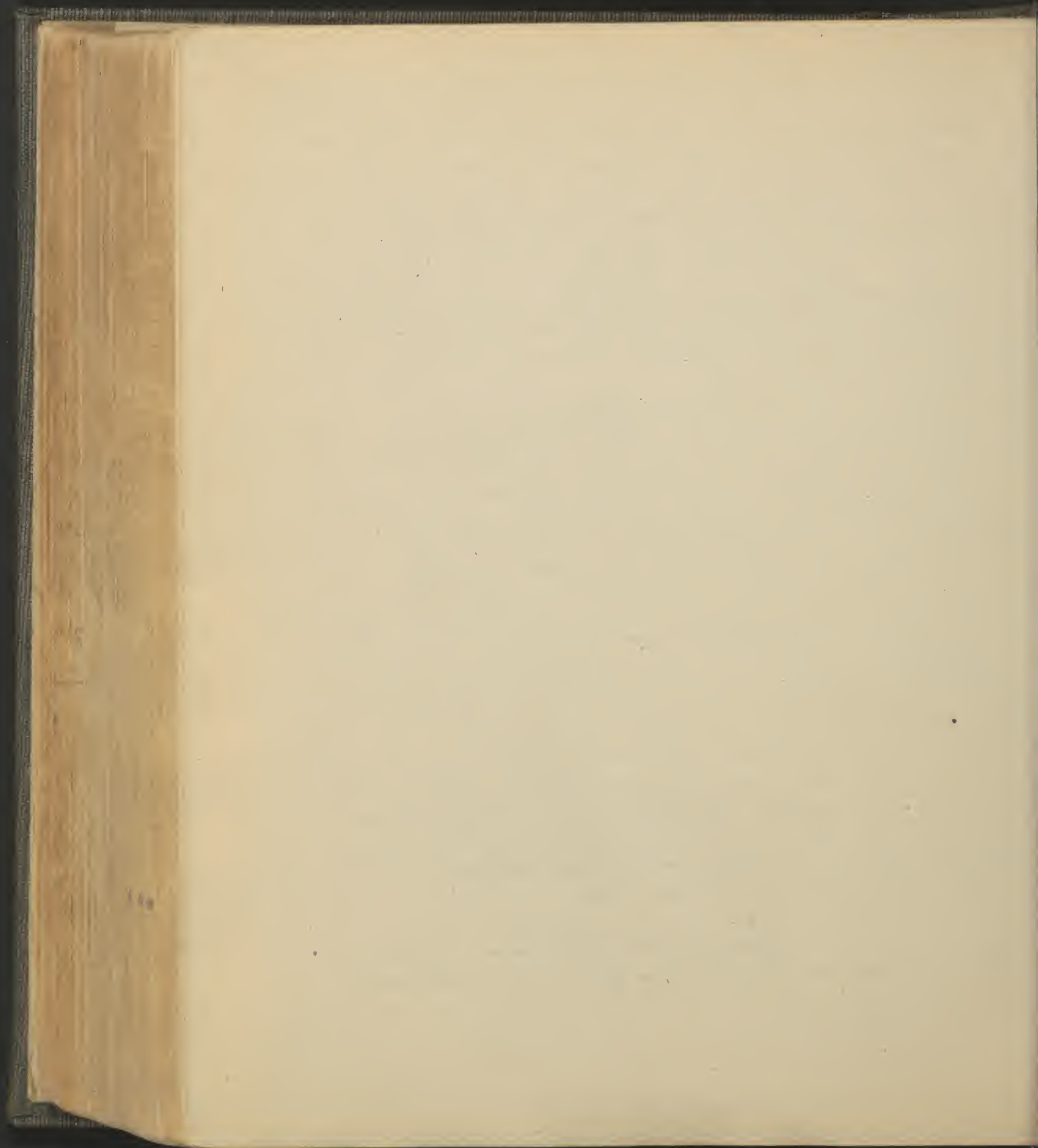
Wherever they are found lymphatics consist of two sets a superficial set, on the extremities lying just beneath the integument, in the viscera ramifying on the surface, and of a deep set which in the extremities are distributed in and among the muscles and in viscera throughout their structure. The greater portion of the lymphatic vessels of the body converge to form one large vessel called the Thoracic duct which conveys their contents into the venous current near the heart.

The Thoracic Duct.

The thoracic duct begins on the front of the body of the second lumbar vertebra by considerable dilatation called the receptaculum chyli and narrowing to a tube of the size of a goose-quill, it ascends on the front of the vertebral column behind the descending aorta, thro' the aortic opening of the diaphragm as high as the fourth dorsal vertebra where it inclines to the left and continues thence an oblique ascent behind the arch of the aorta to a point on a level with the seventh cervical vertebra it there arches forward and downward and opens into the commencement of the left vena innominata. Opening into the commencement of the right vena innominata is another much smaller lymphatic duct (called the ductus lymphaticus dexter) which conveys lymph furnished it chiefly by the lymphatic vessels of the right upper extremity and right side of the head and neck.

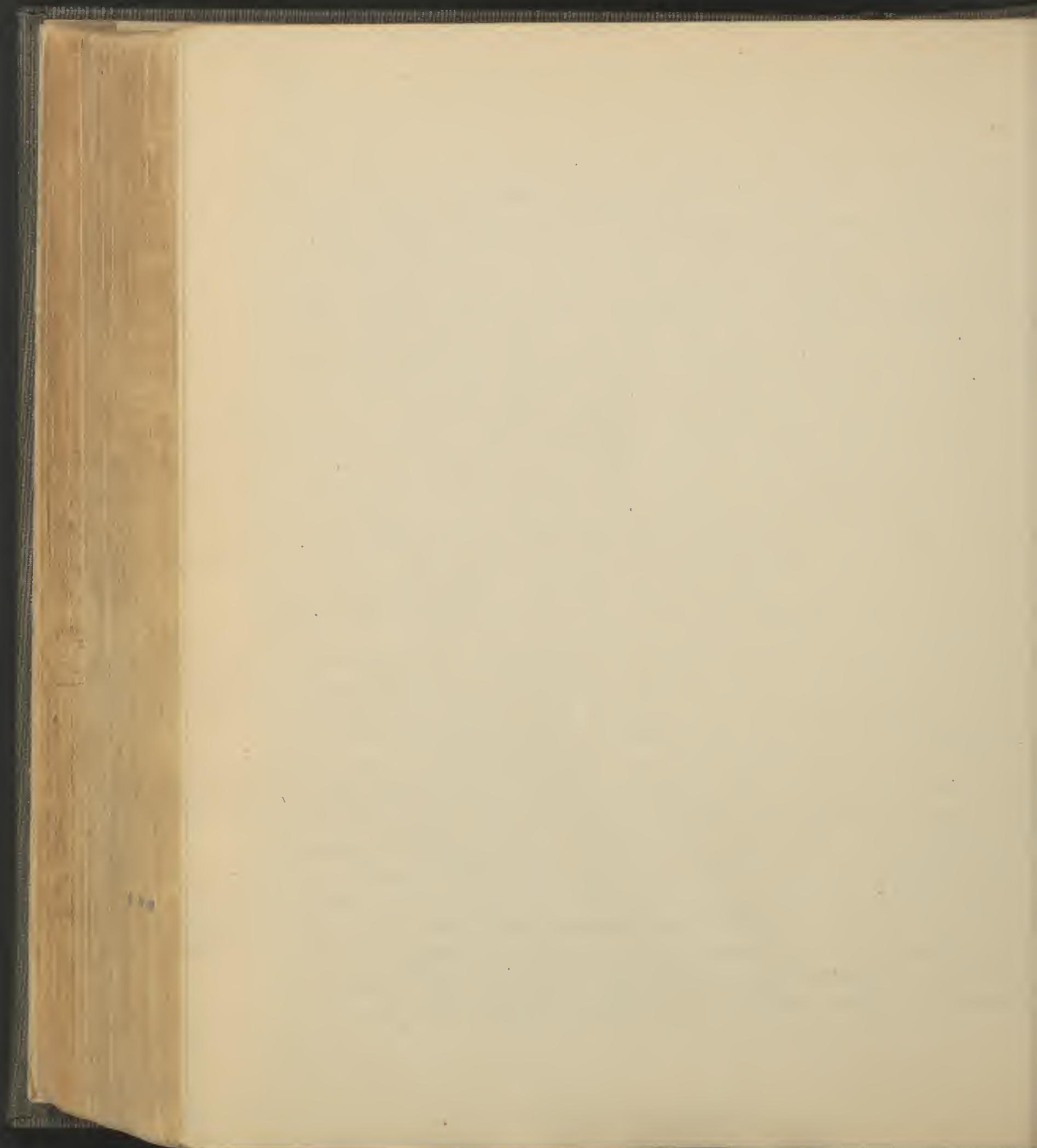
The Lymphatics of the Lower Extremity.

The superficial lymphatics of the lower extremity.



are found crowding upward in immense number along the course of the saphenous veins and reaching the saphenous opening in the fascia lata where the long saphenous vein terminates just below Poupart's ligament they there pass through a set of lymphatic glands. The deep lymphatic vessels accompany the deep veins upward to the groin where they are connected with a set of glands lying beneath the fascia lata and superficial muscles called the deep lymphatic glands of the groin; along the previous course of these vessels are found a few glands some in the popliteal space and one on the front of the interosseous membrane of the leg. The lymphatic vessels from the external organs of generation and from the abdominal parietes can be traced to a third set of glands which form a chain along Poupart's ligament lying superficial and above the glands around the saphenous opening.

All these vessels pass beneath Poupart's to become the external iliac lymphatics which accompanying the external iliac vessels unite the internal iliac lymphatics to form the common iliac lymphatics which accompanying the common iliac vessels unite with those of the opposite side to form the lumbar lymphatics. Scattered at intervals along these vessels from Poupart's ligament are lymphatic glands. The lumbar lymphatics ascend along the aorta constantly increasing in size by accessions from the abdominal viscera, having passed through numerous glands and lessened in number as they increased in size they eventually open into the receptaculum chyli which is so named from the fact



that the lymphatics it receives from the small intestines during the period of digestion are filled with chyle.

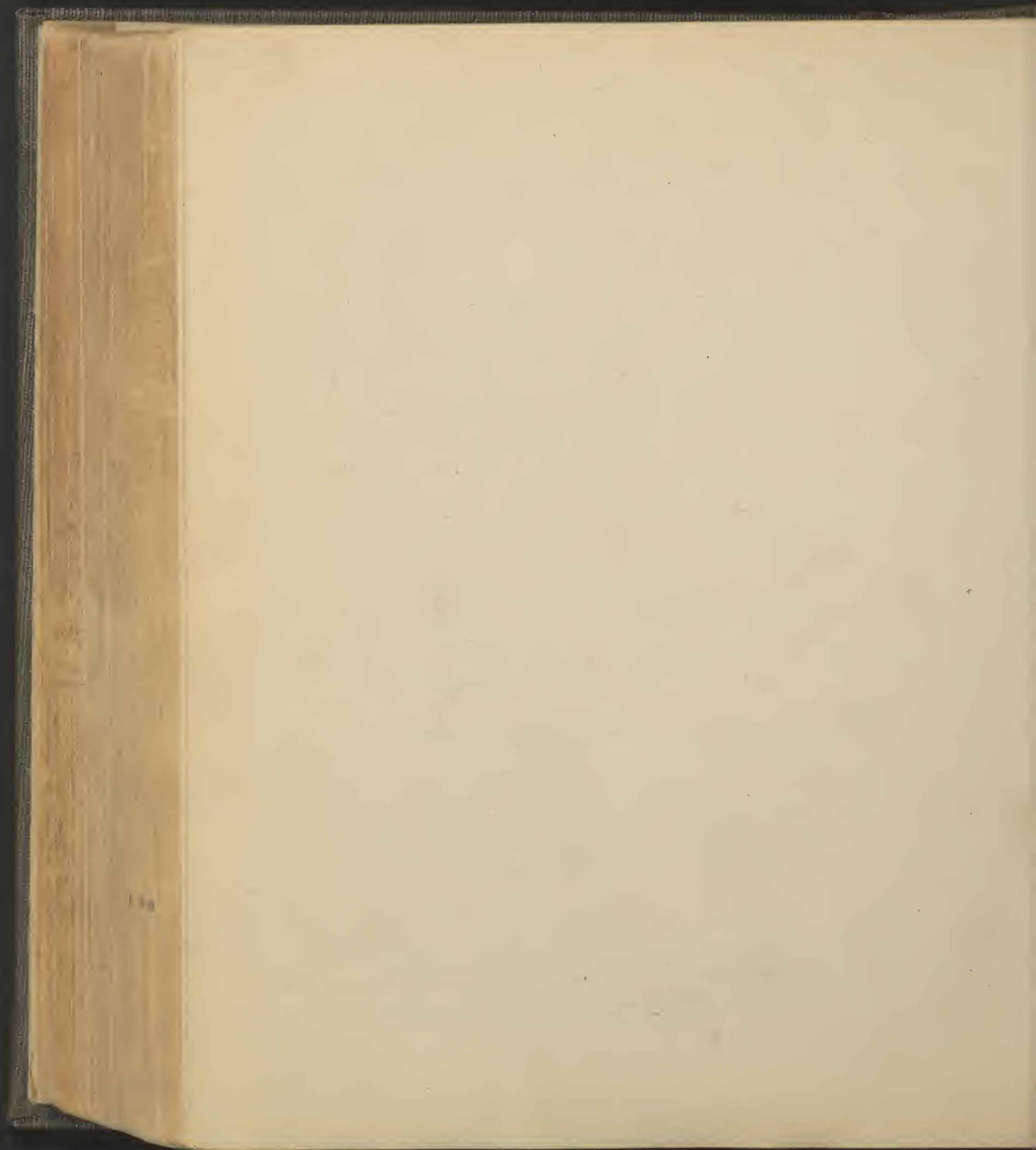
The Lymphatics of the Upper Extremity.

The lymphatic vessels of the upper extremity like those of the lower consist of a superficial set and a deep set the superficial ascend in company with the superficial veins and the deep accompanying the deep veins both converging to the arm-pit where there are some 12 or 15 lymphatic glands; besides the vessels from the upper extremity these glands also receive vessels from the chest wall and mammary gland. A few glands are found along the course of the lymphatic vessels before they reach the axilla, some at the elbow and some along the brachial vessels, these however are small and unimportant. From the axillary glands the vessels proceed along the course of the subclavian vein, on the left side opening into the termination of the thoracic duct and on the right into the ductus lymphaticus dexter.

The Lymphatics of the Head & Neck.

The lymphatics of the neck consist of vessels which have come from the exterior of the head and others which have converged from veins supplying the internal and external jugular veins, no lymphatics however being found in the substance of the brain.

These vessels descend along the external and especially the internal jugular veins and on the right side open into the ductus lymphaticus dexter while on the left they join the thoracic duct.



The Lymphatics of the Thorax -

The lymphatic vessels accompanying the inter-costal vessels open into the thoracic duct; those from the right lung, some from the thoracic parietes, diaphragm, and even upper surface of the liver, and right border of the heart seek the ductus lymphaticus dexter. Those from the left lung left side of the thorax and most of the heart join the thoracic duct. The vessels from the lungs pass through a set of glands situated around the bifurcation of the trachea called the bronchial glands.

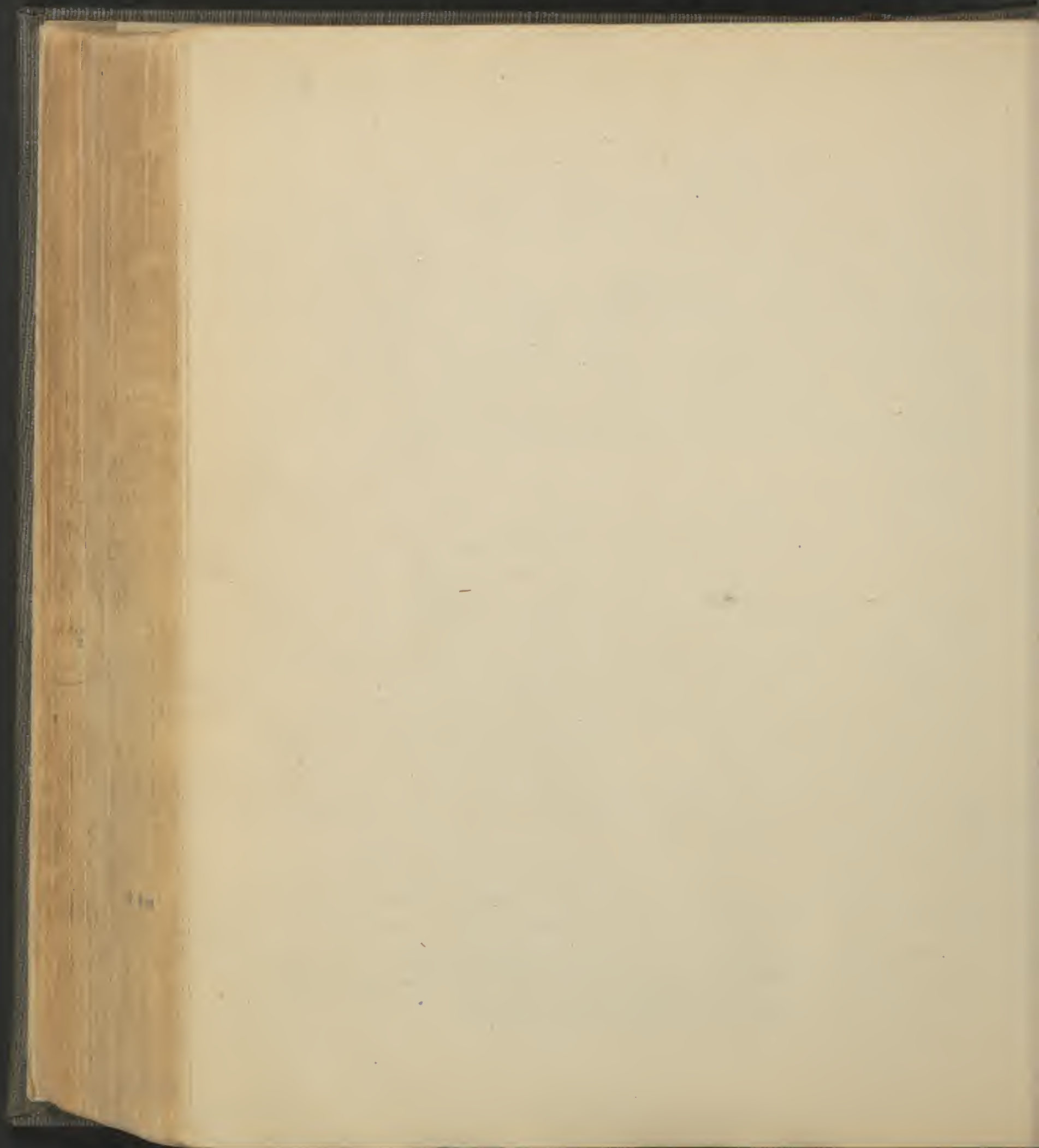
The Nervous System -

- The Cranial Nerves -

The cranial nerves comprise twelve pairs, that is twelve nerves on each side, those of one side having their counterparts on the opposite side.

The definition of a cranial nerve is that it appears at the base of the brain and emerges through an aperture in the base of the skull. The point on the base of the brain the nerve appears is called its apparent origin, since it may be traced into the interior of the brain to what is called its real origin; the real origin of many of these nerves being still a subject of dispute.

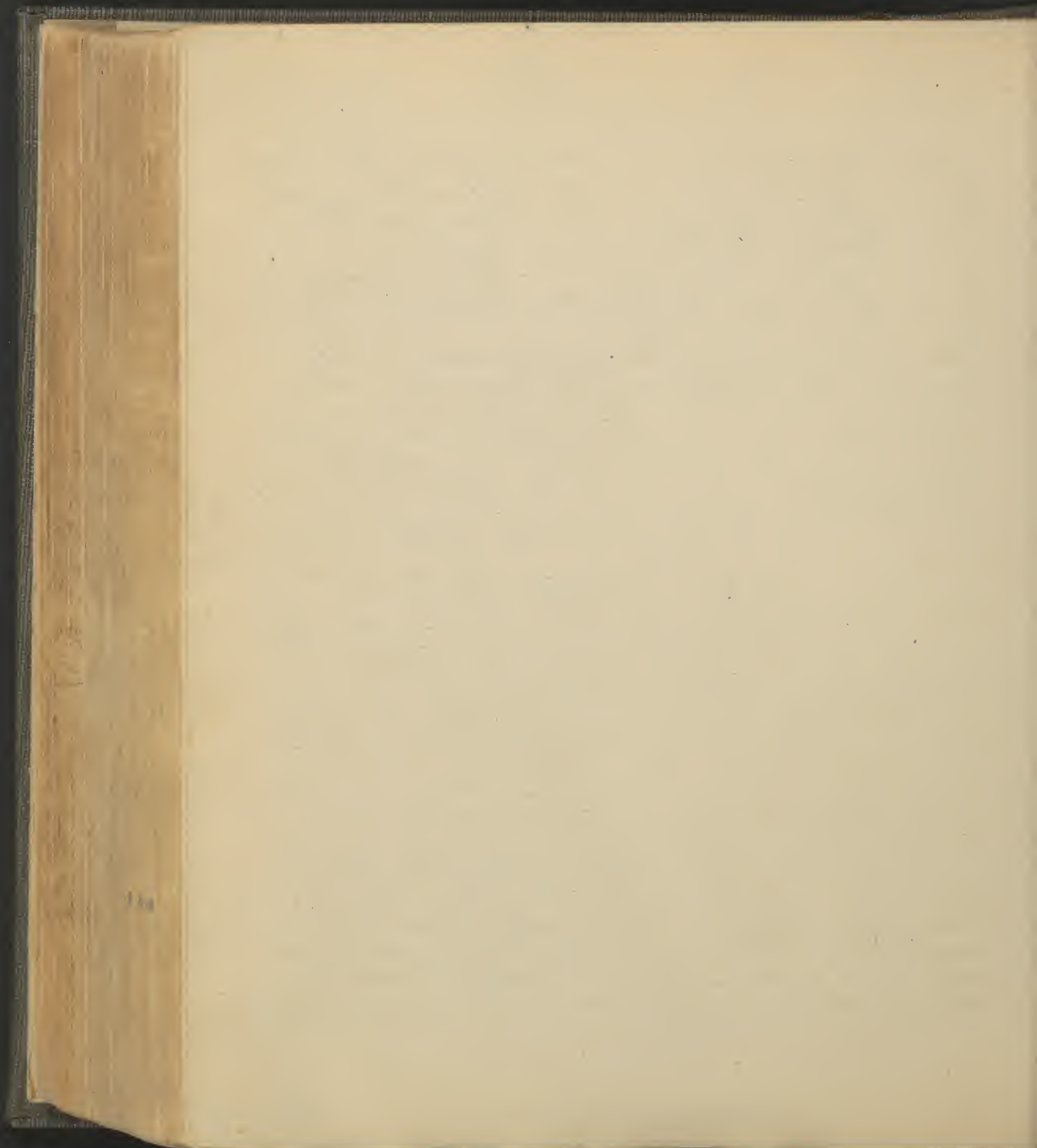
The cranial nerves are named numerically in order from before backwards there being twelve pairs; besides which each pair is known by another or several other names derived usually from the part to which it is supplied - The following table gives the synonyms of the twelve pairs -



- | | |
|--|---|
| 1 st Pair, Olfactory - | 8 th Pair, Auditory - (Portio Mollis - |
| 2 ^d " Optic - | 9 th " Glossopharyngeal - |
| 3 ^d " Motores Oculorum - | 10 th " Pneumogastric, Vagus - |
| 4 th " Lathetic (Trochleares) - | 11 th " Spinal Accessory - |
| 5 th " Trifacial, Trigeminal - | 12 th " Hypoglossal (Lingual) - |
| 6 th " Abducentes - | |
| 7 th " Facial, Portio Dura - | |

These twelve pairs were formerly considered as only nine from the fact that, as will be seen they emerge through nine foramina in the base of the cranium; this classification into nine pairs is known as that of Willis, the one given above as that of Doering; the two classifications are similar for the first six pairs; the seventh pair in Willis's classification comprised the seventh and auditory, while the eighth consisted of the laryngeal, pneumogastric and spinal accessory, and the ninth of the Hypoglossal).

There will first be given a general outline of all the cranial nerves successively from their apparent origins to their points of emergence from the cranium and afterwards each pair will be taken up and described. Of the cranial nerves the first seen on the base of the brain from before backwards is the first nerve; it lies on the under surface of the anterior lobe of the cerebrum in a groove a little external to the longitudinal fissure, having its commencement by a three-forked origin, just in front of the anterior perforated space it enlarges into an oval-shaped mass near the anterior extremity of the anterior cerebral lobe which lies upon the cribriform plate of the ethmoid bone and sends its branches of distribution through the foramina seen there. The second nerve



is first seen under the name of the optic tract, approaching its fellow from the outer aspect of the crus cerebri and passing beside the tuber cinereum uniting with its fellow in front of it to form the optic chiasm or commissure from which the two optic nerves diverge forward to enter the orbits through the optic foramina. The third nerve is seen emerging to the inner side of the crus cerebri just in front of the pons Varolii and running forward to leave the cavity of the cranium by the anterior foramen lacernum. The fourth nerve has its apparent origin external to that of the third, on the optic side of the crus cerebri and it has its exit also through the anterior foramen lacernum. The fifth nerve is the largest of the cranial nerves and is first seen just behind the origin of the fourth nerve, piercing the lateral aspect of the pons Varolii and after splitting into three branches, called ophthalmic, superior maxillary and inferior maxillary^(?) requires three apertures to give it exit from the cranium; the ophthalmic leaves through the anterior foramen lacernum, the superior maxillary through the foramen rotundum and the inferior maxillary through the foramen orale.

The sixth nerve takes its apparent origin behind that of the fifth from the upper constricted portion of the medulla oblongata just behind the pons Varolii and passes forward to gain express through the anterior foramen lacernum which is thus seen to transmit three entire cranial nerves and a part of another these being the 3^d 4th 6th and the Ophthalmic branch of the 5th. The seventh nerve, the eighth,

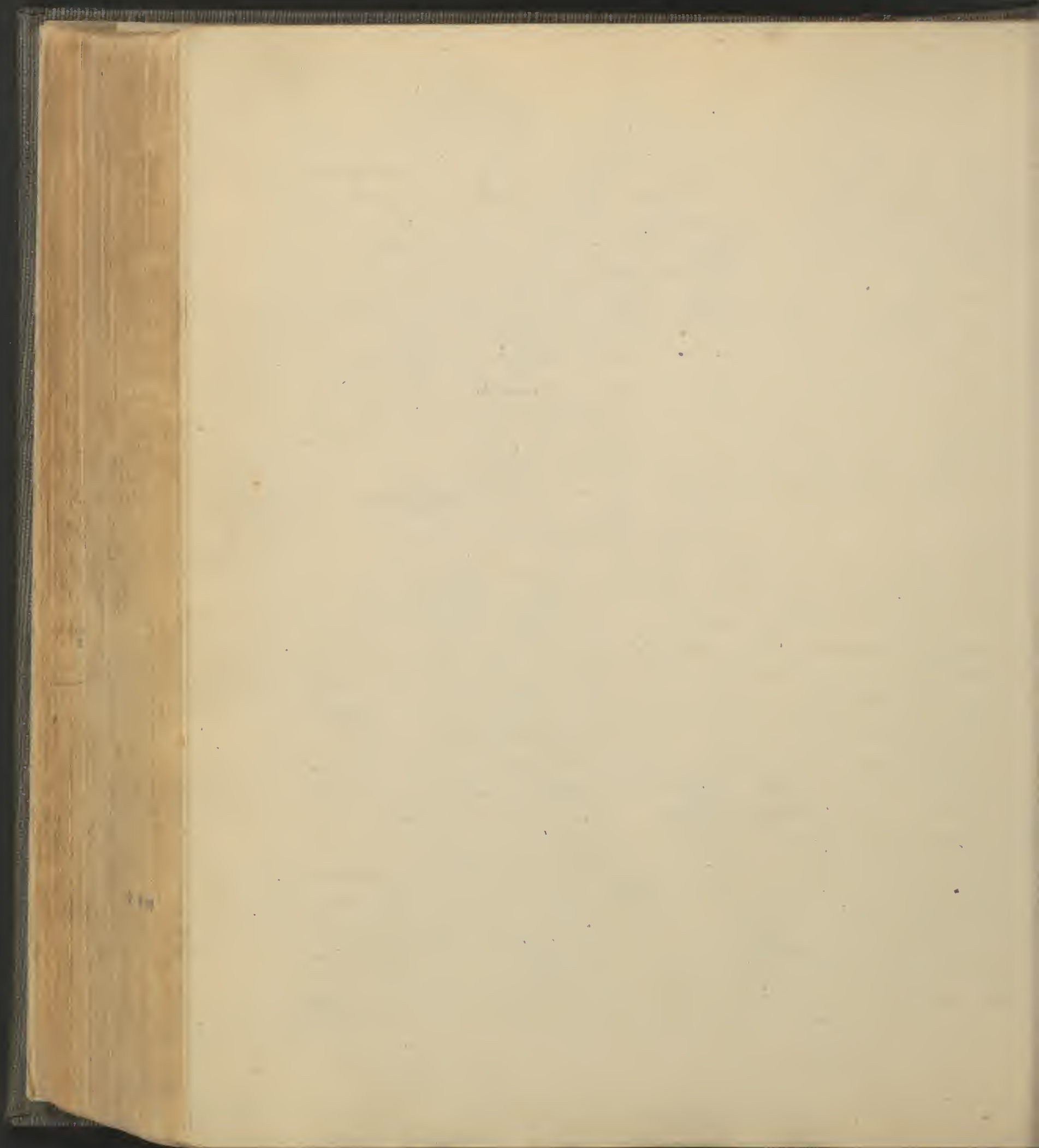
Deep region -

ext root	Tracheus	^{grey matter}	in	temp	spher. lobe.
Middle -	"	"	"	"	Ant. lobe
int	"	Gyrus	francatus -		

the ninth, the tenth and the eleventh, all arise on this order from above downward in the groove between the corpora olivacea and restiforme of the medulla oblongata; the seventh and eighth both leave through the same foramen the internal auditory meatus - the remaining three, 9th 10th & 11th all gain exit through the posterior foramen lacerum. The twelfth nerve has its apparent origin to the inner side of the five preceding nerves from the groove between the corpora olivacea and pyramidalia, by numerous filaments which are speedily collected into two cords which unite to form the nerve as it emerges through the anterior condyloid foramen.

1st Nerve - Olfactory.

The first nerve, or the olfactory nerve, arises by a three-forked origin close to the anterior perforated space; the external or long root consists of white fibres and may be traced along the fissure of Sylvius into the middle lobe of the cerebrum, the middle root is of gray matter and springs from the posterior part of the anterior lobe, the inner or short root is of white fibres and also arises from the posterior part of the anterior lobe - The three roots unite to form the nerve just in front of the anterior perforated space, which passes forward triangular in shape and grayish in color lying in a groove on the under surface of the anterior lobe of the cerebrum a little external to the longitudinal fissure and swells into an oblong grayish enlargement called the bulbous olfactorius, which lies beside the crista galli on the cribriform plate of the ethmoid bone - From the



surface of the olfactory bulb are given off some twenty filaments which descend into the nose through the foramina of the cribriform plate to be distributed to the mucous membrane of the nose as far down as the middle turbinated bone; these filaments may be arranged in three sets, those to the septum narium, those to the external wall and those to the roof of the nose -

- 2^d Nerve - Optic -

The second nerve or optic nerve has its apparent origin just external to the crus cerebri, whence it may be traced to its deep or real origin from various parts of the optic thalamus and from the corpora quadrigemina; winding around the outer side of the crus cerebri it passes forward and inward beside the tubus cinereus and in front of it enters with its fellow to form the optic commissure or chiasm; this portion of the nerve from its origin to the chiasm is called the optic tract. From the optic chiasm the two optic nerves diverge anteriorly to enter the orbits through the optic foramina, each pierces the sclerotic and choroid coats of the eyeball and expands into the Retina.


The connection between the optic tract chiasm and nerve is as follows - The optic tract is composed of filaments, the outermost of which pass into the nerve of that side, the innermost cross over through the chiasm to form the innermost fibres of the opposite tract; the middle fibres of the tract of one side cross through the chiasm to form the middle fibres of the nerve of the opposite side; the innermost fibres of one nerve arch over through the chiasm to become

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Abducens = 6th
Paralyticus = 4th

360

the innermost fibres of the opposite nerve and thus all the fibres of either nerve are accounted for.

3^d Nerve - motor oculi

The third nerve, or motor oculi, leaves the brain to the inner side of the crus cerebri close to the front of the pons Varolii passes forward in the outer wall of the cavernous sinus enters the orbit through the foramen lacrym anterius and divides into two branches which supply all the muscles within the orbit except the superior oblique and external rectus. As it enters the orbit it lies between the two heads of the external rectus and thence one of its branches ascends to supply the superior rectus and levator palpebrae while the other is distributed to the internal rectus the inferior rectus and the inferior oblique; all its fibres enter the muscles on their ocular aspects - N.B.

- 4th Nerve - Paralyticus

The fourth nerve, or paralyticus, appears external to the apparent origin of the 3^d nerve, viz. to the outer side of the crus cerebri and passes forward in the outer wall of the cavernous sinus, enters the orbit through the foramen lacrym anterius and is distributed to the superior oblique from its orbital surface. is the lightest nerve in the system even above the 5th to the inner side

- 5th Nerve - the facial

The fifth nerve, or trifacial, or trigeminal appears just behind the fourth nerve emerging from the lateral aspect of the pons Varolii - It arises by two roots, one is known as the anterior or small or motor root, the other as the posterior, or large or sensitive root. The

Glossary of English & scientific names of plants from
the "Ed. Digital" collection

Ophthalmic Spots with 3 branches } each
} foot
} nail

Glossary of English & scientific names of plants from
the "Ed. Digital" collection } (written)

Ophthalmic Spots } each
} foot
} nail

Glossary of English & scientific names of plants from
the "Ed. Digital" collection } (written)

Large root passes forward over the superior border of the petrous bone near its apex and then swells into a ganglion known as that of Gasser, which lies in the digital depression on the anterior face of the petrous bone. The small root passes forward beneath the large and is found lying under the ganglion of Gasser without participating in its formation.

The ganglion divides into three branches: ophthalmic, superior maxillary and inferior maxillary. The latter is joined to the small root of the nerve and is therefore the only one of the three branches of the 5th nerve which possesses motor endowments.

I. The Ophthalmic Nerve.

The ophthalmic branch passes forward and soon divides into three branches: lacrimal, frontal and nasal, which enter the orbit through the foramen lacuum anteriora.

(1.) Lacrimal Nerve.

The lacrimal nerve passes forward along the outer wall of the orbit to supply the lacrimal gland and not being exhausted in this duty continues its course to emerge at the outer angle of the orbit and supply the integument adjacent.

(2.) Frontal Nerve.

The frontal branch passes forward on the levator palpebrae muscle to divide into two branches: supra-orbital and supra-trochlear. In back of orbit the supra-orbital branch emerges from the orbit at the supra-orbital foramen to supply the upper lid and the muscles and integument of the

Heart Hunter in the Moral Journal
with a view to the improvement of the same
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The importance of the
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Fore head as far back as the vertex of the skull.
 (2) The supra-trochlear branch advances to the inner angle of the orbit where it emerges above the forea trochlearis, hence its name and is distributed to the inner angle of the eye and the integument of the root of the nose and middle of the forehead.

(3) The Nasal Nerve - floor of 4th ventricle. ^{2nd division}
 The nasal branch crosses the optic nerve advancing along the inner wall of the orbit entering the cavity of the cranium through the anterior ethmoidal foramen and is there found lying in the slit beside the crista galli whence it sinks into the cavity of the nose and divides into a branch for the mucous membrane of the nose and another to descend along the posterior aspect of the nasal bone to its lower edge where it emerges through the notch found there and supplies the integument of the nose to its tip. Just as the nasal nerve is entering the ethmoidal foramen it gives off a branch called the infra-trochlear, which passes forward to emerge at the inner angle of the orbit below the forea trochlearis and supply the lachrymal sac and inner angle of the eye. It also gives off besides the infra-trochlear three other branches in the orbit, one to the ophthalmic ganglion of the sympathetic system, and two ciliary branches which pierce the sclerotic coat and pass forward between it and the choroid to be distributed to the iris.

II. Superior Maxillary Nerve.

The superior maxillary branch of the fifth nerve, like the ophthalmic has a forward course, it gains egress through the foramen rotundum continues its forward

Lower Lake, Alaska, N-Side of Nome. 9. *gallinule*

has to come out is getting from the former I understand
to prosecute the rabbit (quite the *intra rabbit* poor)

Синтез
Синтез

direction across the spheno-maxillary fossa along a groove on the floor of the orbit sinks beneath the floor and emerges at the infra-orbital foramen on the face to give sensibility to adjacent parts, viz, lower lid, cheek side of the nose and upper lid.

Branches-

Besides the terminal ones to the face the branches of the superior maxillary are the following and omitted in this order-

(1) - Orbital - ^{or} ~~or~~

The orbital or temporo-malar branch enters the orbit through the spheno-maxillary fissure and divides into two branches, viz, temporal and malar. The temporal branch enters the temporal fossa through the outer wall of the orbit, while the malar branch continues along the outer wall of the orbit to emerge on the cheek at the outer angle. ~~See requirements. Vandy~~

(2) - Spheno-palatine -- ~~communicating~~

The spheno-palatine are two branches of communication which descend to Meckel's ganglion of the sympathetic in the spheno-maxillary fossa.

(3) Dental Branches.

The chief distribution of the superior maxillary nerve is to the teeth and gums of the upper jaw and this is effected by two branches posterior and anterior dental. The posterior dental is first emitted and supplies the three molar teeth and bicuspid; the anterior dental leaves the main trunk just as it is about to emerge on the face and supplies the two incisors.

As such being as the person supply a clear
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upper teeth, the canine and the front bicuspid.

The anterior and posterior dental nerves anastomose in the bone and supply each tooth with as many filaments as the tooth has fangs besides giving twigs to the gums.

-III- Inferior Maxillary Nerve-

The inferior maxillary branch of the fifth nerve consists of a branch from the ganglion of Gasser and the small motor root of the fifth nerve; these unite and their course is downward through the foramen orale; immediately after emerging from which the nerve divides into an anterior and a posterior trunk. The distribution of each trunk is as follows.

(1). The anterior trunk breaks up into branches which supply the muscles of mastication each branch bearing the name of the muscle to which it is distributed and conferring motor influence.

(2)- The posterior trunk divides into three branches, inferior dental, gustatory and auriculo-temporal.

1st Inferior Dental-

The inferior dental branch curves forward and downward to enter the dental foramen of the lower jaw and runs along a canal in the bone giving filaments to all the teeth of the lower jaw; as it passes the mental foramen, it gives off a branch which escapes there and supplies the integument of the lower lip. Just before entering the dental foramen the nerve gives off a branch called the mylo-hyoidian, which descends along the groove on the inner surface of the inferior maxilla and is distributed to the mylo-hyoid muscle and anterior belly of the digastric.

Sub. max. ganglion
720-
Gasser's

between the
2nd & 3rd
mandibular
teeth

Notes of the Gardening Branch

Notes on the Gardening Branch

Common with the ...

1st parallel with the Mex. city.

2nd Behind the ... city.

2^d The Gustatory Branch-

The gustatory nerve passes downward and forward first behind the external pterygoid muscle then between the pterygoid muscles, then between the internal pterygoid and ramus of the lower jaw and reaching the side of the tongue and splits into many filaments to supply the anterior part of the tongue. The gustatory nerve while between the two pterygoid muscles and receives at an acute angle the chorda tympani nerve a branch of the seventh nerve, which it transmits to the submaxillary ganglion of the sympathetic; The gustatory gives off a branch of communication to the twelfth nerve beneath the tongue-

3^d The Auriculo-temporal Branch-

The auriculo-temporal branch arises by two roots and first passing backward behind the articulation of the lower jaw it then ascends between the m. auditorius externus and condyle of the lower jaw and emerging from beneath the parotid gland divides into branches called anterior and posterior temporal which supply the integument of the temporal region. It gives off branches to the articulation of the lower jaw, to the parotid gland, to the pinna to the meatus auris and two communicating branches to the facial nerve.

6th Nerve - Gray Mass - Floor of 4th Ventricle-

The 6th nerve, or abducens has its apparent origin from the upper convoluted part of the medulla oblongata just behind the pons Varolii and advanced along the inner wall of the cavernous sinus to

(Facial nerve or 7th.)

Commences in the groove between the corpus olivace and res tiformi and going into petrous bone by the int. Auditory meatus it passes out of the petrous bone by means of the Stylo mastoid foramen passing through the parotid gland over the external carotid artery is distributed to the muscles of the face except the muscles of mastication

Branches

Beside its terminal branches it gives off the following

- I Auditory
- II Tympanic
- III Corda Tympani
- IV Stylo hyoid
- V Digastric
- VI Post Auricular

Posterior
Posterior

enter the orbit through the anterior foramen lacrimum and be distributed after passing between the two heads of the external rectus muscle to the ocular face of that muscle.

7th Nerve - Motor nerve of face.

The seventh or facial nerve is the uppermost of the five nerves which spring from the groove between the corpus sphenoidale and corpus rectiforme; just beneath it in the same groove is another nerve called the portio intermedia which unites with it and if this nerve be counted separately there may be said to be six nerves springing from the same groove successively. It makes for the internal auditory meatus which it enters in company with the auditory and when the two reach the bottom of that short canal the facial parts from its companion by entering another canal in the petrous bone called the aqueduct of Fallopius which conducts it first outward then backward and then downward to the stylo-mastoid foramen, emerging from which it passes forward through the parotid gland over the external carotid artery and divides into numerous branches which are distributed to all the muscles of the face except those of mastication and of these the buccinator gets a branch from the facial.

Cornea with numerous deep - = motion to the buccinator.

Branches -

Besides its terminal filaments on the face off the facial gives off the following branches.
1st Auditory - which is furnished the auditory nerve while the facial is in the internal auditory

Intercusentia gangliiformis.

Curve of N.

Intercusentia gangliiformis which is in
the hiatus Fallopii has the communi-
-cations Perforans Superficialis major
Perforans " " minor
Major with Meckel's ganglia
minor " the Aortic " "
and external petrosal to the
Carotid Plexus.

mentum.

2^d Tympanic, which arises from the facial while it is in the aqueduct of Fallopius and is distributed to a muscle of the tympanic cavity.

3^d Chorda Tympanica, which is emitted from the facial just above the stylo-mastoid foramen and first ascends through the petrous bone and enters the tympanum at the base of the pyramid on its posterior wall, then crosses on the inner surface of the membrana tympanica and leaves through the passage of Glaser; having emerged from which it joins the gustatory nerve between the two stylo-glossal muscles and continues with it to the submaxillary ganglion. After emerging from the stylo-mastoid foramen, the facial gives off the following branches - 4th Stylo-hyoid, which supplies the stylo-hyoid muscle.

5th Digastric which is distributed to the posterior belly of the digastric muscle.

6th Posterior Auricular, which ascends behind the ear and after communicating with the auricular branch of the trigeminal, is distributed by an anterior branch to the auricle and by a posterior branch to the back of the head.

Besides the foregoing the facial has numerous communicating branches three of these proceed from a gangliform swelling of the nerve called the intrajugular ganglion situated at the hiatus Fallopii; they are the nervous petrosus superficialis major to Meckel's ganglion the nervous petrosus superficialis minor to the 5th ganglion and the external petrosal to the carotid plexus.

After emerging the facial communicates with the,

Glossopharyngeal
Auricular magnus
Auricular temporal

July 12, 89

8th & 9th nerves

Ligaments of Sacrum. vertebro-cortical
Costo-sternal - Scapulo-mammary
Sternal clavicular - Scapulo-clavicular

9th or Gloss Pharyngeal 4th Ventricle
3rd nerve arising from the groove between
the corpus olivare and Pustiformi and
escapes from the cranium with 10th & 11th
through the post-lacerated foramen
behind the int. carotid. and after
crossing the int. carotid it terminates
in the muscles^{mem.} of the tongue

Branches.

- 1 Tympanic branch {
 - a living mem by imp. & Eust tube
 - b fenestra Rotunda
 - c " " ovalis
 - d carotid plexus of the Sympth
 - e nervous petrosus superficial. maj
 - f " " " minor

2 Muscular branch

3 Pharyngeal on post pt. of Ph.

4 Tonsillar branch.

Branches of communication are
first 2 are from the petrosus ganglion
1st & 2nd

367

glosso-pharyngeal, auricularis magna of the cervical plexus and receives two large branches from the auriculo-temporal.

- 8th Nerve - Floor of 4th Ventricle.

The eighth nerve, or portio mollis, or auditory is the second of the nerves arising from the groove between the corpora Clivare and restiforme. It passes downwards along with the 7th nerve, the internal auditory plexus at the bottom of which it divides into a cochlear branch and three vestibular branches, these being distributed to corresponding parts of the labyrinth.

- 9th Nerve - Floor of 4th Ventricle.

The ninth nerve, or glosso-pharyngeal, is the third nerve arising from the groove between the corpus clivare and restiforme and escapes along with the 10th & 11th nerves from the cranium through the posterior foramen lacerum, lying behind the internal carotid artery it then passes forward between the artery and internal jugular vein to the outer side of the artery then crosses the artery in front to the posterior border of the stylo-pharyngeus, then crosses this muscle to be distributed by its terminal filaments to the mucous membrane of the posterior part of the tongue - ^{soft palate -}

- Branches.

Besides its terminal branches the 9th nerve gives off four branches of distribution. While in the jugular foramen the nerve presents the gangliform enlargements the uppermost of these is small and unimportant called the jugular ganglion while the lower

at base of skull you have a ganglion
on the nerve - 4th cranial nerve

Superficial

Branches of communication -

- I 1 to the ganglion of the 10th nerve
- II one to the Superior cervical ganglion
of the Sympathetic
- III one to the 9th nerve
- IV one to carotid plexus

is larger and called the petrous ganglion; from the latter proceeds one branch of distribution, the tympanic.
 1st The tympanic branch passes to the tympanum through a canal which opens on the ridge of bone between the carotid and jugular foramina; after reaching the tympanum it is distributed by six branches as follows. (Petrous nerve)

- (a) one to the lining membrane of the tympanum and the Eustachian tube.
- (b) one to the fenestra rotunda.
- (c) one to the fenestra ovalis.
- (d) one to the carotid plexus - of the sympathetic Eustachian tube.

(e) one to the nervus petrosus superficialis major.

(f) One to the nervus petrosus superficialis minor.

2^d The muscular branch - which supplies the stylohyoid - posterior belly of the digastric and stylohyoid.

3^d The pharyngeal branches, which are found on the posterior part of the pharynx aiding to form a plexus called the pharyngeal from which the pharynx is supplied; the other nerves entering into this plexus are from the 10th nerve, the Pharyngeal and superior laryngeal branch of the 10th and the sympathetic.

4th The Tonsillitis branches which form a plexus on the tonsil.

The branches of communication of the 9th nerve are as follows, the first two are from the petrous ganglion.
 1st One to the ganglion of the 10th nerve.
 2^d One to the superior cervical ganglion of the sympathetic.

10th Nerve or Pneumogastric
is the 4th nerve arising from the groove between
the corpora olivaria and restiformis escaping
from the cranium ~~via~~ by the jugular
foramen innervates by supplying the stomach

Branches

- I Pharyngeal
- II Superior Laryngeal
- III Recurrent " " "
- IV Post Pulmonary
- V Anterior Pulmonary
- VI Oesophagus or Oesophageal
- VII Cardiac

The right nerve crosses the 1st portion of the sub
clavian

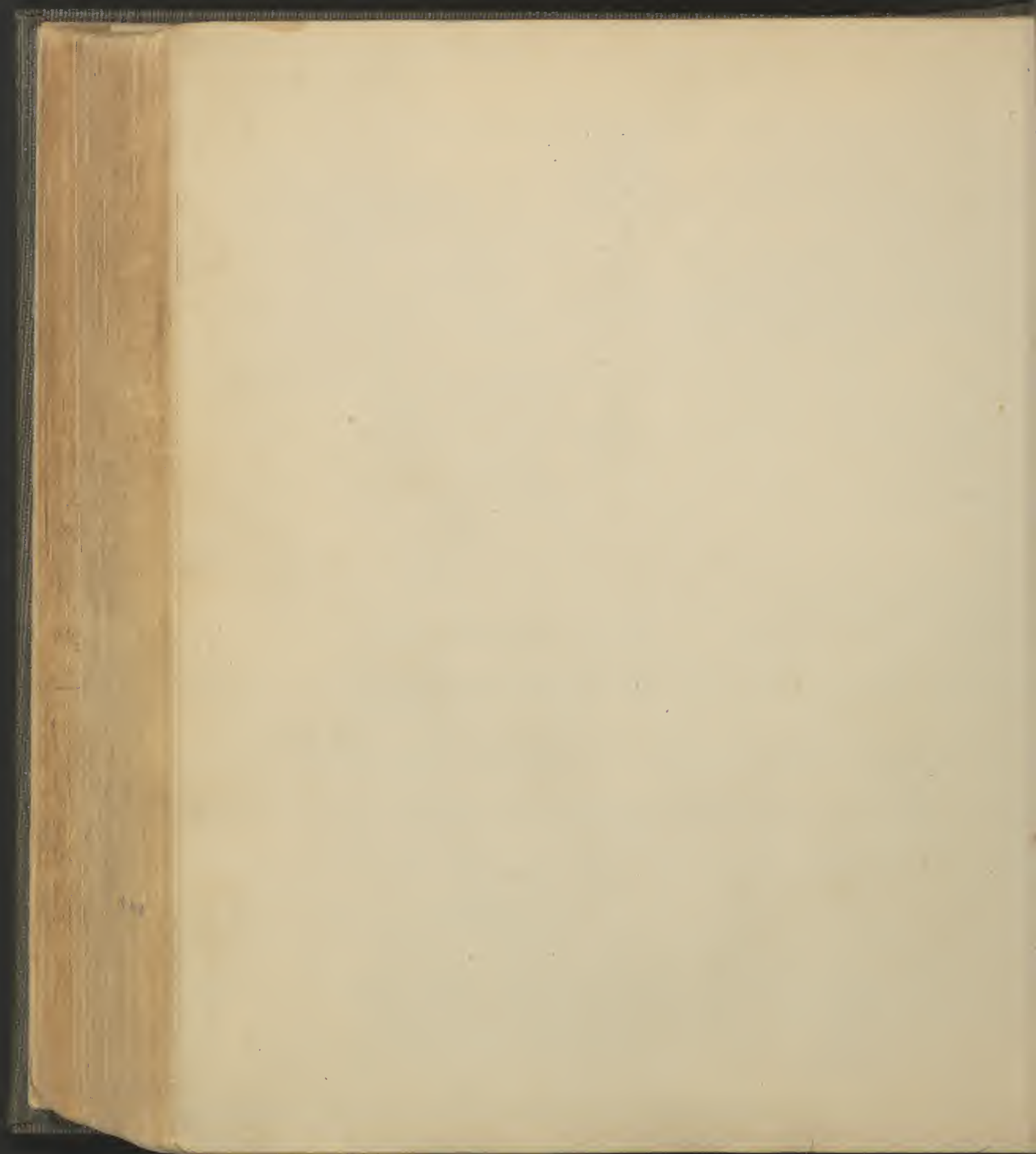
The left nerve enters the thorax 1st portion of
sub clavian crosses front and of aorta

3^d Ine to the 7th nerve-

4th Carotid filaments, which descend with the carotid artery-

- 10th Nerve - Floor of 4th Ventricle-

The tenth nerve, or pneumogastric, or vagus, or par vagum, in the fourth nerve arising from the groove between the corpora olivaria and testiforme, it escapes from the cranium through the jugular foramen and descends the neck, enters the thorax through which it passes along the oesophagus and with the latter gains the abdomen where it is found running from left to right along the lesser curvature of the stomach. In the neck the course and relations of the nerve are the same on both sides, that is each nerve lies first between the internal jugular vein and internal carotid artery then between the internal jugular vein and common carotid artery, until it reaches the root of the neck when the relations thenceforward vary according to the side; the right nerve at the root of the neck crosses the first portion of the right subclavian artery enters the chest reaches the posterior aspect of the root of the right lung descends thence along the posterior aspect of the oesophagus to the stomach and runs along its lesser curvature being distributed by its terminal branches to the anterior face of the stomach; the left nerve enters the thorax lying on the front of the first portion of the left subclavian artery crosses the front of the arch of the aorta reaches the posterior aspect of the root of the left lung and thence to the stomach is found on the front of the oesophagus, reaching



the stomach it runs along the lesser curvature and is distributed to the anterior face. While in the jugular foramen the nerve presents a gangliform enlargement called the ganglion of the root and about $\frac{1}{2}$ in below this a second larger one on the ganglion of the trunk.

- Branches -

The branches of distribution besides the terminal or gastric, are:

1st Pharyngeal.

The pharyngeal branch arises from the ganglion of the root and descends to the posterior aspect of the pharynx to aid in forming the pharyngeal plexus.

2^d Superior Laryngeal.

The superior laryngeal branch arises from the ganglion of the trunk and descending pierces the thyro-hyoid membrane and is distributed to the mucous membrane of the larynx (and gives a filament to the arytenoid muscle) - Just below the thyro-hyoid membrane it gives off a branch called the external laryngeal, which is distributed to the thyroid gland and crico-thyroid muscle and furnishes some filaments to the pharyngeal plexus.

- 3^d Recurrent Laryngeal.

The recurrent or inferior laryngeal branch arises at a different point on the two sides; on the left it arises as the nerve is crossing the aorta and winds backward around the aorta; on the right side it comes off as the nerve crosses the subclavian artery and runs upward behind that artery; either nerve after

Communication of the sympathetic out of plexus
ganglion of the root — 11th nerve
9th nerve

Sup. cervical plexus of Sympth.
and vagus nerve at the
arteries

plexus of the heart communicates with
the 12th nerve and the loop
between the first & 2nd cervical nerves.

its origin ascends the groove between the oesophagus and trachea, giving filaments to those parts and is distributed to all the muscles of the larynx except the crico-thyroid.

4th Posterior Pulmonary.

The posterior pulmonary branches from an intricate plexus on the back of the root of the lung whence filaments are sent into the lung along the bronchial tubes.

5th Anterior Pulmonary.

The anterior pulmonary branches form a smaller plexus on the front of the root of the lung.

6th Oesophageal.

The oesophageal branches are filaments furnished to the oesophagus before the nerves are in relation with it; the plexus communicates frequently around the tube surrounding it with numerous anastomoses thus forming the oesophageal plexus.

7th Cardiac.

The cardiac branches are numerous, they arise in the upper part of the neck in the lower part of the neck in the thorax and from the recurrent laryngeal nerve, and are destined for the heart.

The communications of the pneumogastric are as follows - the ganglion of the root communicates with the 11th nerve with the 9th nerve and with the superior cervical ganglion of the sympathetic, besides which gives off an important branch called the auricular which joins the facial nerve in the angle.

116
This is the only one remaining from the
conference all were read & passed

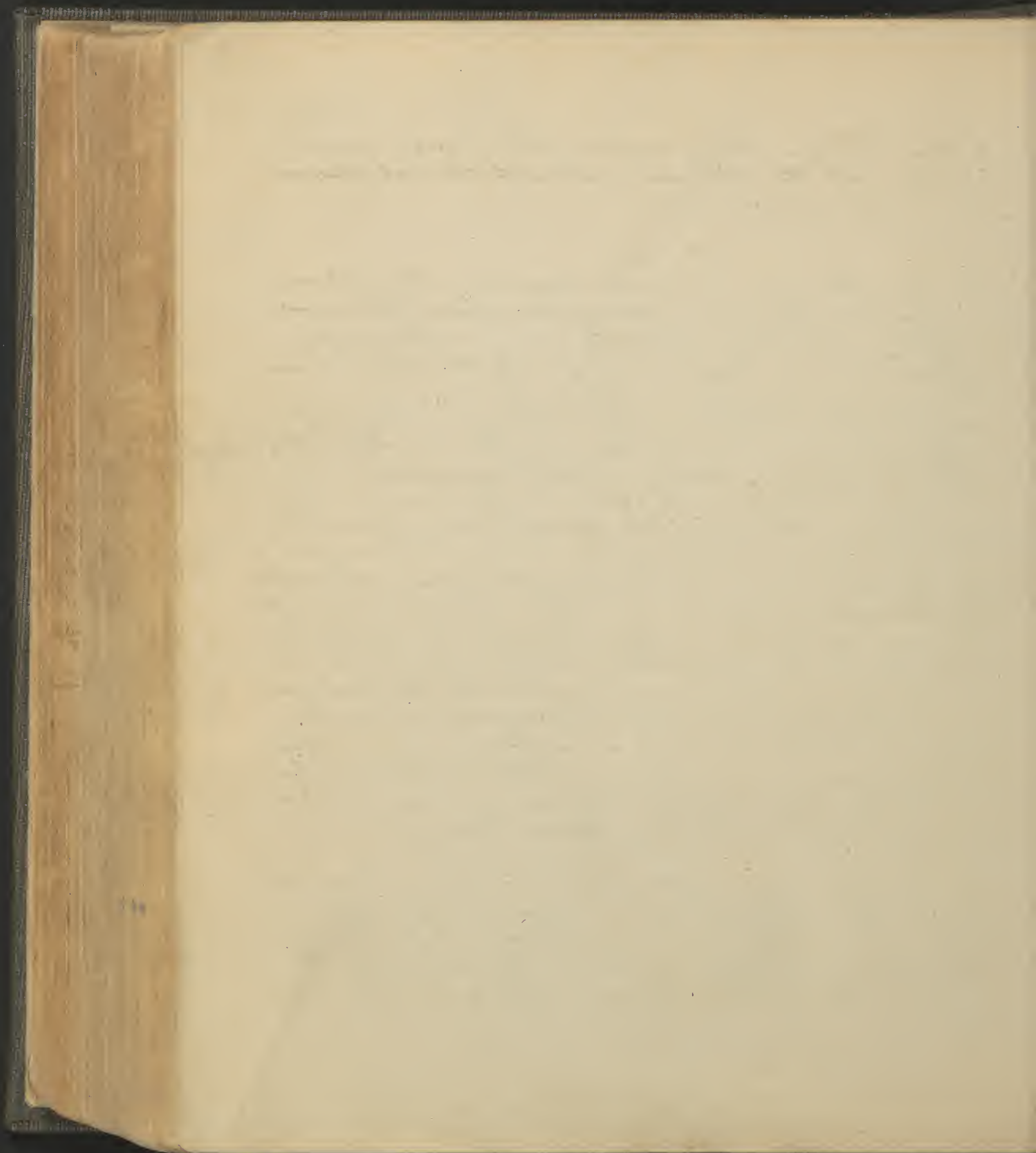
ductus Fallopii - The ganglion of the trunk communicates with the 12th nerve and with the loop between the 1st & 2^d cervical nerves -

- 11th Nerve -

The eleventh nerve, or spinal accessory, is the fifth nerve arising from the groove between the corpora olivare and restiforme and escapes from the cranium through the posterior foramen lacernum along with the 4th & 10th nerves. The nerve consists of two portions; 1st A cranial or accessory portion which arises from the groove between the corpora olivare and restiforme and after communicating with the spinal portion goes to the pneumogastric nerve. 2^d A spinal portion, which arises by successive filaments from the side of the spinal cord as low as the 5th cervical nerve and ascends between the two roots of the spinal nerves; this to enter the cranium through the foramen magnum and after communicating with the accessory portion emerges through the jugular foramen passes downward and outward pierces the sternocleidomastoid muscle, and reaches the trapezius muscle to which it is distributed giving on its way filaments to the sternocleidomastoid. The two portions of this nerve are never closely united but after the spinal portion has ascended to the cranium several communicating branches pass between them -

- 12th Nerve -

The twelfth nerve, or hypoglossal, arises from the groove between the corpora olivare and pyramidalis by ten or twelve filaments which are gathered into two bundles, these pass outward and just as they are leaving the cranium through the anterior condyloid foramen unite



to form the trunk of the nerve -

The nerve then descends between the internal jugular vein and internal carotid artery and when it reaches a point on a level with the angle of the jaw it curves forward in front of both external and internal carotid arteries and after communicating with the gustatory nerve is distributed to the muscles of the tongue -

- Branches -

The branches of distribution besides the terminal are two, descendens noni a very important branch and the thyro-hyoidean of small importance -

1st Descendens Noni Nerve - *Latin Descendens noni*

The descendens noni nerve leaves the hypoglossal just as it is crossing the external carotid artery and derives its name from its descending direction and from the fact that the parent, the 12th nerve, was in Willis' classification of the cranial nerves called the 9th nerve (vide p. 50) - The descendens noni passes down the neck on the front of the sheath of the external carotid and then on the front of the sheath of the common carotid artery; occasionally it descends within the sheath; about the middle of the neck it anastomoses with filaments of the 2^d & 3^d cervical nerves, the communicans noni, thus forming what is called the arch of Scarpa which lies in front of the sheath of the common carotid artery about the middle of the neck - From this arch branches proceed to the depressor muscles of the hyoid bone except the thyro-hyoid muscle -

- 2^d Thyro-hyoidean Branch -

The thyro-hyoidean branch descends from near the termination of the hypoglossal nerve to supply the thyro-

begins at lower order of granular fragments.

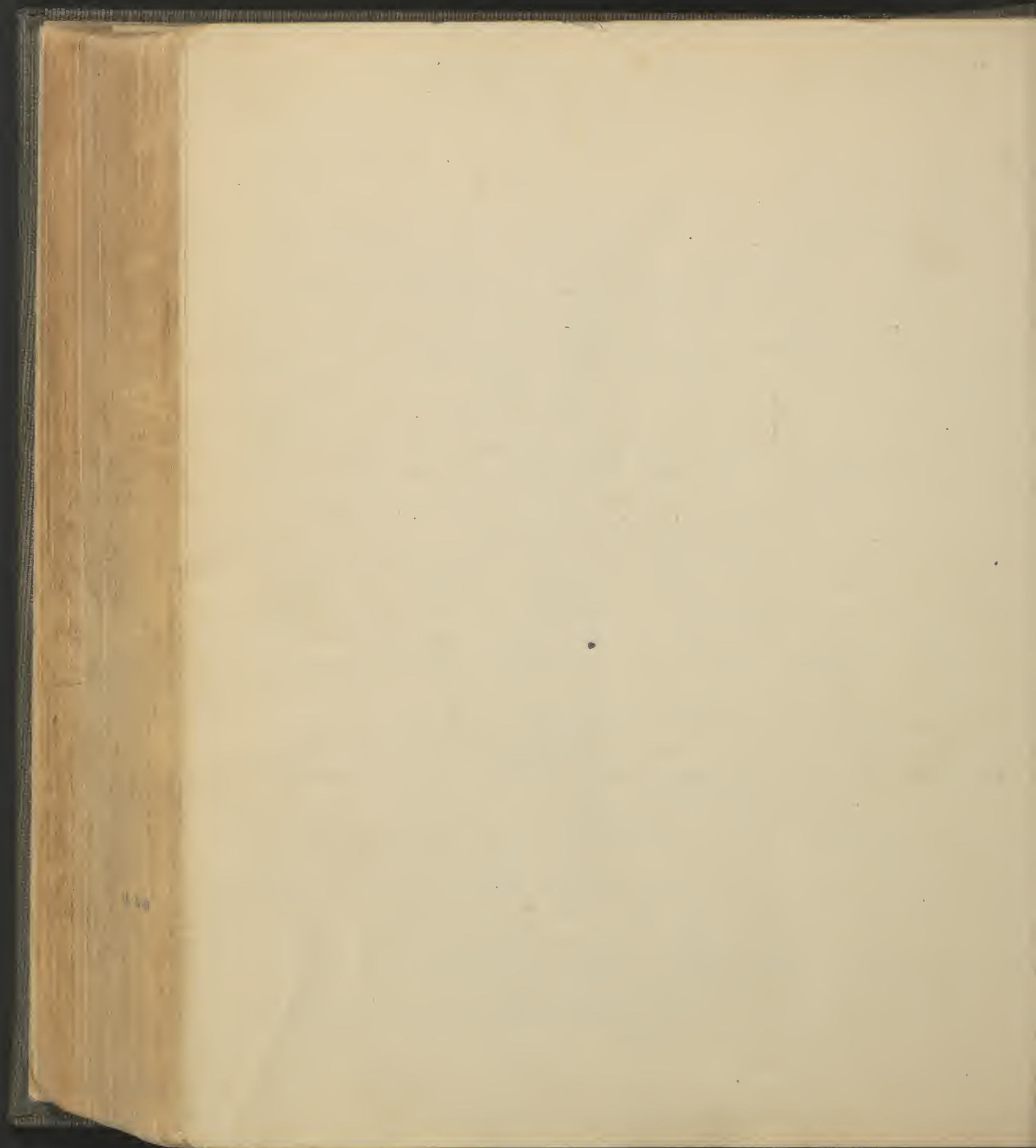
lyard muscle.

- The Spinal Cord.

The spinal cord, or spinal marrow, or medulla spinalis, is that portion of the cerebro-spinal axis of the nervous system which is found in the spinal canal. It does not extend in the adult the whole length of the canal but beginning at the foramen magnum terminates on a pointed extremity at the lower border of the body of the 1st lumbar vertebra, thence onward the canal is occupied by the nerves, which it has given birth. In the young subject the spinal cord will be found to reach the whole length of the spinal canal but as development proceeds the canal increases in length much faster than the cord elongates.

The spinal marrow like the brain is invested by three membranes dura mater arachnoid and pia mater which are continuous with the similar membranes of the brain. The dura mater of the cord however is not adherent to the interior of the wall of the canal but is separated by a considerable interval the wall being provided with a proper periotomy.

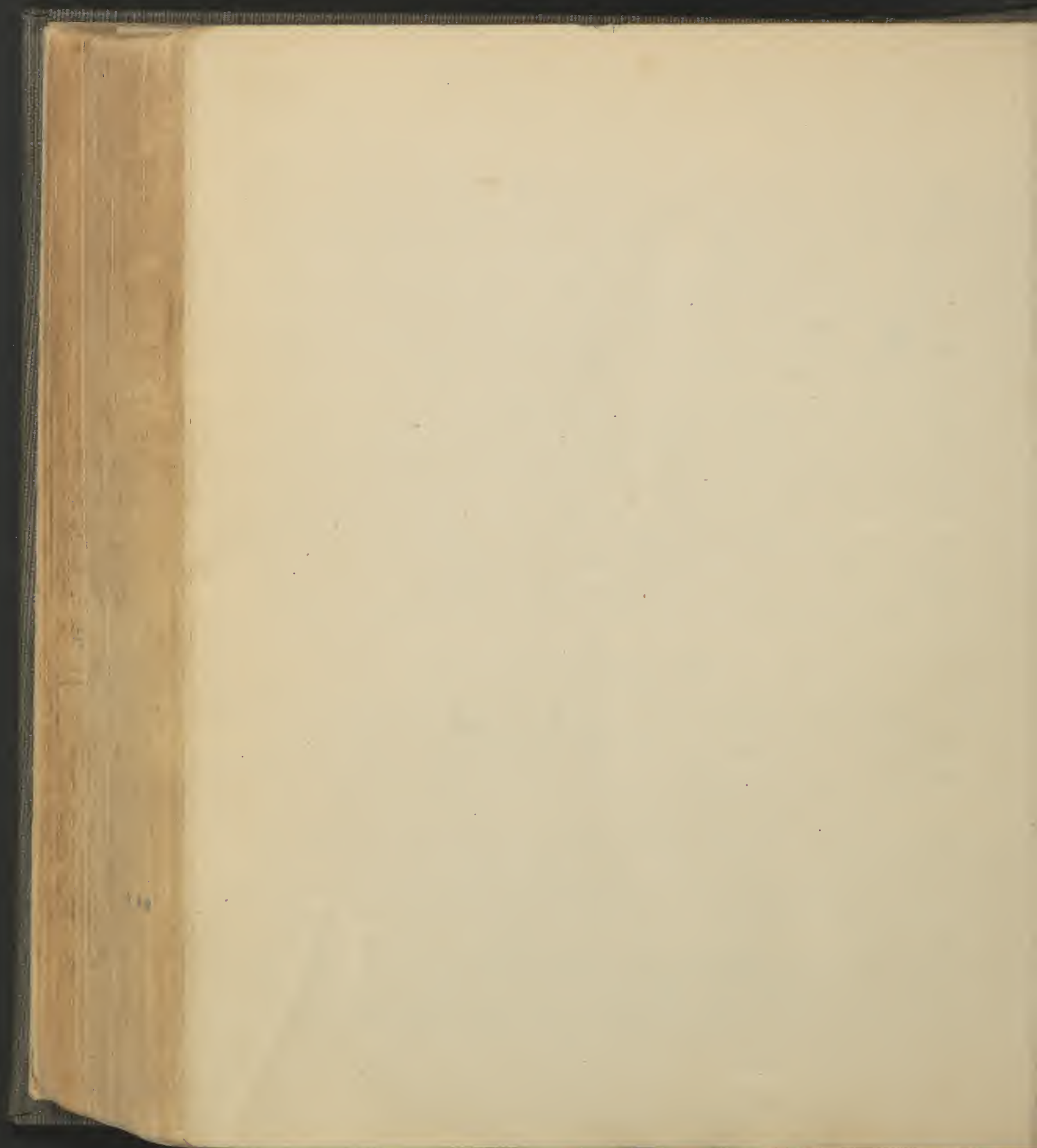
The spinal marrow is composed of white matter externally and of gray matter within and is marked down its middle both in front and behind by grooves called the anterior and posterior median fissures, the posterior being much the deeper. The lateral halves of the cord thus formed are connected by a band whose thickness is measured by the interval between the bottom of the anterior and posterior median fissures; the front and back of this band are white fibres and called the white commissures of the cord but in the centre the band is gray called the gray commissure.



the white commissure connect the white matter on the exterior of each lateral half and the gray commissure the gray matter of the interior. This gray matter is found to be placed in the posterior of each half on a crescentic shaped ridge the convexity of the crescent looking towards the opposite side and receiving the gray commissure while the horns of the crescent pass, one, the anterior, outwards and forwards, and the other, the posterior, outwards and backward on the white matter, the posterior horn coming nearer to the surface than the anterior. Each lateral half of the spinal cord is marked by two longitudinal fissures there being slight much more so that the anterior and posterior median fissures, thus each lateral half of the cord is subdivided into three columns by these grooves known as the antero-lateral and posterolateral sulci in contradistinction to the median fissures.) -

The Spinal Nerves.

Emerging from each lateral aspect of the spinal marrow and proceeding as the result of its termination are nerves known as the spinal nerves there being thirty-one pairs of these, a pair consisting of a nerve to one side having its exact counterpart on the other. A spinal nerve arises by two roots, one from the antero-lateral sulcus of the cord and called its anterior or motor root and the other from the posterolateral sulcus and called the posterior or sensory root; soon after its origin the posterior root presents a gangliform enlargement immediately after the formation of this ganglion the two roots combine to form the nerve which escapes from the spinal canal & through an intervertebral foramen, ex-



cept the 1st nerve which makes its exit between the atlas and occipital bone and the two last spinal nerves which leave the canal through the aperture at the lower extremity of the sacrum.

The thirty one pairs are arranged into groups around from the region of the spine where they emerge, thus cervical nerves consisting of the 8 first pairs

Dorsal	12 pairs
Lumbar	5 "
Sacral	6 "

It is sometimes said that the six last nerves consist of 5 sacral nerves and coccygeal.

Immediately after each nerve has emerged from the spinal canal it divides into two branches or cords one called posterior which is intended for the supply of the elements of the back in which the nerve finds itself and as the structures of the back are of small importance these posterior cords of the spinal nerves will be no further considered. The other branches of the spinal nerves are called the anterior cords and are of great importance as they supply the most important structures of the front of the body and the extremities. In all the regions of the body except the dorsal the nerves before proceeding to their distribution intercommunicate and form separate intricate networks in the various regions called plexuses from which branches proceed to supply the parts for which the nerves are intended four or five nerves usually uniting to form a plexus. The first plexus formed by spinal nerves is the cervical.

-The Cervical Spinal Nerves.

rectus

95/13

900

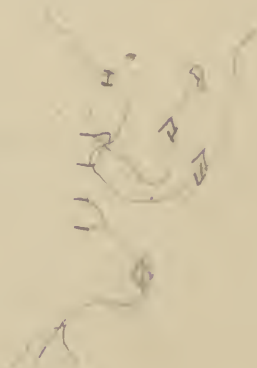
levator Lguli scapuli, Scalenus anticus + med.

has 2nd

3rd

4th

5th as filament.



The cervical spinal nerves are 8 pairs, the posterior cords of these go to the structures of the back of the neck, while the anterior cords of the four upper form the cervical plexus, and of the four lower go to the brachial plexus.

- The Cervical Plexus. ✓

The cervical plexus is formed by the intercommunications of the four upper cervical nerves (their anterior cords) and is found beneath the middle of the sterno-cleido-mastoid muscle. The principal distribution of the plexus is to the integument and muscles of the neck. Its branches are divided into two sets, a superficial set to the skin and a deep set to muscles.

The superficial branches are the four following.

I. Superficialis Colli - of 2^d & 3^d Cervical. ✓

The superficialis Colli emerges around the posterior border of the sterno-cleido-mastoid muscle about its middle and runs forward and upward on that muscle to be distributed to the integument of the front of the neck, as high as the chin, giving off in its course a descending branch to the front of neck & upper arm.

II. Auricularis Magna - of 2^d & 3^d Cervical. ✓

The auricularis magna branch, coming out about the middle of the posterior border of the sterno-cleido-mastoid muscle ascends on that muscle and is distributed by two branches to the front and back of the ear having given off filaments to the skin in its course.

III. Occipitalis Minor - of 2^d Cervical. ✓

The occipitalis minor branch ascends parallel with the posterior border of the sterno-cleido-mastoid muscle and is distributed on the side of the head behind the ear as high as the vertex.

connected by two large branches

Deep branches $\overline{V} - \overline{VI} \overline{VII}$

Ascending ramus - is not a branch of
the hypoglossal but of the cervical
plexus - 92 P.B. \overline{EJ}

Communicates with sympathetic system at
its base.

Lower end of chorda 7, was also
obs. - Place for the 1st bulb -

13

descendens noni

379

- IV. Descending Superficial Branches - of 3840 - ✓

The descending superficial branches supply the integument of the lower part of the neck and crossing the clavicle terminate in the integument of the upper part of the thoracic wall from the sternum to the acromion process. These descending branches are sometimes divided into three sets, sternal, clavicular and acromial, these names indicating the directions of the various fibres. The deep branches of the plexus comprise the following three -

V. Muscular Branches -

The muscular branches supply the praevertebral group of muscles. i.e. all the muscles of the neck except the depressors of the hyoid bone.

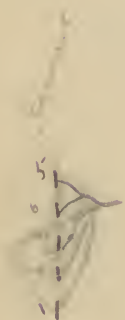
VI. Communicans Noni - ✓

The communicans noni branch is formed by two filaments, from the 2^d & 3^d nerves and curving downward and forward communicates with the descendens noni from the hypoglossal nerve and with it forms Segipias, which in front of the common carotid sheath about the middle of the neck, from which filaments supply the depressor muscles of the hyoid bone except the thyro-hyoid.

VII. The Phrenic Nerve - ✓

The phrenic nerve is formed by contributions from the 3^d, 4th & 5th cervical nerves and after descending a short distance these are reinforced by a filament from the 5th nerve. The course of the nerve on the two sides is different; descending on the front of the scalenus anticus muscle, on the right side it generally slips to the inner side of that muscle and crosses in front of the 1st portion

On the application of pole of the battery to skin the phrenic
 nerve I behind the mid- of S.C. muscle but that root
 of the neck you apply it in the interval between the
 sternal and Clavicle-region of the S.C. muscle.



What nerve lies behind the Brachial (Cervical)
 --- " " Ext. 10 " " " "
 1- " " int. 10 " " " "

of the right subclavian artery between it and its vein and continues its downward course into the thorax beside the right vena innominata and superior vena cava, downward in front of the root of the right lung, thence inward between the pleura and pericardium and reaching the diaphragm pierces it and is distributed to it from its under surface; the nerve of the left side differs from this in two particulars only, it enters the chest lying on the front of the 1st portion of the left subclavian artery and then crosses the arch of the aorta, otherwise its course is the same as that of the right nerve except that it has no relation to the left vena innominata and superior vena cava. Occasionally the right nerve does not get to the inner side of the scalenus anticus muscle until it has passed the subclavian and in this case it crosses the 2^d portion of that artery.

The Brachial Plexus.

The brachial or axillary plexus is the second plexus formed by the anterior cords of the spinal nerves and is the result of the intercommunications between the anterior cords of the four lower cervical nerves - (5th & 6th, 7th & 8th) and the greater portion of the 1st dorsal. The manner of its formation is as follows, the 5th & 6th cervical nerves unite at once and the cord thus formed is soon joined by the 7th cervical; the 8th cervical nerve and 1st dorsal unite to form one cord and thus at one time there are but two cords to the plexus, but soon these two cords each give off a branch which unite to produce a third cord. The course of the plexus is downward and outward; it first lies between the two scaleni muscles then lies in relation to the second portion of the subclavian artery, above and ~~between~~ ^{on its} side, behind

along the outer side of 2nd pt. of subclavian
on the 1st pt. it lies behind it.

3rd of face only
 2nd of face
 3rd of face

acute on front of acy. 3rd ft.
 The median nerve in front - then to out. side.

Ext. Respiratory nerve?
 Sub. Scapular nerves?

and then comes into relation with the axillary artery lying first to its outer side, then to its outer side and behind, then to its outer side behind and to its inner side and finally the two lateral cords producing each a branch these unite to form the median nerve and the artery is entirely enveloped. - 3rd pt of artery - (1) just pt of 5th joint.

- Branches -

The distribution of the brachial plexus is chiefly to the upper extremity supplying its muscles and skin but before reaching the upper extremities it gives off some muscular branches - The branches of the plexus are divided into two sets, muscular and terminal.

- Muscular branches -

As the brachial plexus is coursing with the subclavian and axillary arteries it gives off numerous filaments to neighboring muscles, viz to the acalergi rhomboid and subclavus; (these being collectively known as the superior muscular branches), besides which there are other muscular branches bearing specific names as follows -

Supra-scapular Branch - of outer cord -

The supra-scapular branch passes outward to gain the dorsum of the scapula through the supra-scapular notch and be distributed to the supra and infra-spinati.

Anterior Thoracic Nerves - of outer and inner cords

below Scapula -

The anterior thoracic nerves arise one from the inner cord of the plexus and the other from the outer cord and after forming a loop of communication over the axillary artery are distributed to the pectoral muscles.

- Posterior Thoracic Nerve - of 5 & 6 Cervical.

The posterior thoracic nerve, or external respiratory, is

branches of the ext cord.

the nerve for the serratus magnus muscle - It is formed by a filament from the 5th and another from the 6th cervical nerves and descending behind the axillary vessels is distributed to the serratus magnus muscle as it courses down on it.

- Sub-scapular Branches - of post cord -
The sub-scapular are several branches (3) to the sub-scapularis, teres major and latissimus dorsi muscles.

- The Terminal Branches -

The terminal branches of the plexus are seven in number as follows; musculo-cutaneous, internal cutaneous, lesser internal cutaneous, median, ulnar, musculo-spiral and posterior circumflex. The plexus gives origin to these branches after the following manner, the external cord produces the musculo-cutaneous, and one head of the median, the internal cord splits into the internal cutaneous lesser internal cutaneous, ulnar and one head of the median; the posterior cord gives origin to the musculo-spiral and posterior circumflex -

I. Musculo-cutaneous Nerve - ✓

The musculo-cutaneous nerve pierces the coraco-brachialis and pierces downward and outward between the biceps and brachialis anticus muscles to become superficial at the outer side of the front of the elbow where it divides into two cutaneous branches (external cutaneous) which are distributed to the integument of the outer side and outer portion of the front of the forearm as far as the wrist. Besides its terminal distribution it supplies the coraco-brachialis, biceps and brachialis anticus muscles -

Lesser int. cutaneous

arises with the ~~ulnar~~ and int cut. nerves
it receives fibres from 8th cervical & 1st dorsal
nerves passes through axillary space at 1st
lying behind then on inner side of brachial
axillary artery. vein and communicates
with intercosto humeral nerve descends on
inner side of brachial artery to middle
of arm where it pierces the fascia ^{at mid of humerus} and
is distributed to the skin of lower $\frac{1}{3}$ of
arm

Rec. a communicating branch. name?

Intercostal humeral

P.S. it communicates with post
branch of int. cutaneous

int. cord

dist. to all except
int. side of front
arm.

II. Internal Cutaneous Nerve.

The internal cutaneous nerve descends to the inner side of the axillary and brachial arteries and about the middle of the arm pierces the deep fascia to become superficial and divides into branches which are distributed to the inner side and inner part of the front of the fore-arm as far as the wrist. It gives filaments also to supply the integument of the front of the arm - is superficial and gives branches to it.

int. cord. - superficial in lower pt.

III. Lesser Internal Cutaneous Nerve.

The lesser internal cutaneous nerve, or nerve of Triesberg, descends the inner side of the arm and divides into filaments which are lost in the integument of the lower third of the posterior aspect of the arm. It is the smallest of the terminal branches of the plexus and as seen is now exhausted.

ext. & int. cord

IV. Median Nerve.

The median nerve arises by two roots, one from each lateral cord of the plexus, which unite in front of the axillary artery just below the pectoralis minor muscle. It descends first to the outer side of the axillary artery, then to the outer side of the brachial artery and then about the middle of the arm crosses usually in front to the inner side of the brachial artery, which relation it maintains to the front of the elbow where it first earns the name of median being here for the first time in the middle of the limb; from its origin to the elbow it is superficial entering the fore-arm it becomes deep for passing into it between the two heads of the pronator radii teres muscle it descends the fore-arm beneath the

Branches Median nerve

2 supply the palmar aspect of thumb
sending off branches which supply all of
the palmar aspect of the fingers but ulnar
side of ring finger and little finger.

A Branch to all the thenar group which
arise from the Annular lig and trapezium

The ulnar nerve supplies all the mus on
front of arm except the $\frac{1}{2}$ of flexor carpi
ulnaris

flexor sublimis digitorum muscle and enters the palm of the hand beneath the anterior annular ligament and divides into its terminal branches which are distributed as follows; two to supply the sides of the palmar aspect of the thumb one to the radial side of the index finger, one which divides to supply the adjacent sides of the index and middle fingers, one to divide for the adjoining sides of the middle and ring fingers and lastly a muscular branch which supplies the following muscles of the thenar eminences abductor pollicis, flexor oris metacarpi pollicis and superficial head of the flexor brevis pollicis (i.e. all the muscles arising from trapezium and annular ligament). Until it reaches the elbow the median nerve emits no branch, while at the elbow and lying beneath the aponeurotic slip of the biceps it produces a number of muscular branches which supply all the muscles of the front of the fore-arm except one and a half flexor carpi ulnaris and the ulnar half of the flexor profundus digitorum these being appropriated by the ulnar nerve. The branch to the pronator quadratus descends on the front of the interosseous membrane from the elbow and is called the anterior interosseous nerve. At the lower part of the fore-arm the median gives off a cutaneous branch which descends in front of the anterior annular ligament to the skin of the palm.

The Ulnar Nerve

The ulnar nerve descends at first to the inner side of the axillary and brachial arteries but as it passes down the inner side of the arm it diverges from the

here it supplies $1\frac{1}{2}$ mm in hand + $1\frac{1}{2}$ in arm

Ulnar.

all mus Hypo thenar Em.
and the adductor Pollicis
deep bed of flex. br. " "

283
72

brachial artery making for the inner side of the back of the elbow where it lies in the groove between the humeral condyle and olecranon forming what is called the "funny bone" entering the fore-arm between the two heads of the flexor carpi ulnaris muscle it comes into relation at the commencement of the middle third of the fore-arm with the ulnar artery and lying to the ulnar side of that vessel it enters the palm of the hand and divides into a superficial and a deep palmar branch. The superficial palmar branch supplies the palmaris brevis muscle, the integument of the inner border of the hand and divides into two branches one of which supplies the inner side of the little finger and the other after giving a communicating branch to the median nerve divides to supply the adjacent sides of the little and ring fingers. The deep branch disappears between the abductor minimi digiti and flexor brevis minimi digiti and after supplying the muscles of the hypothenar eminence passes across the palm with the deep palmar arch of the radial artery and is distributed to one muscle and a half of the thenar eminence, adductor pollicis and deep head of the flexor brevis pollicis. On the fore-arm the ulnar nerve emits the following branches:

- 1st Muscular branches to the flexor carpi ulnaris and ulnar half the flexor profundus digitorum.
- 2^d An important cutaneous branch which descends superficially into the palm to be lost in the skin.
- 3^d A dorsal branch, which arises about two inches above the wrist and passes backward beneath the tendon of the flexor carpi ulnaris muscle to the dorsum of the hand when it communicates with the radial nerve.

Terminal branches of Mus. Spinal
Radial and inter osseous
Also gives off branches
1 front of arm
1 back of arm
1 back of fore arm.



and divides into branches which supply the integument of the inner portion of the forearm, and the fingers and a half, viz, the little finger, the ring finger and the ulnar side of the middle finger.

II. Musculo-spiral Nerve.

The musculo-spiral branch springs from the posterior cord of the brachial plexus and is the largest branch of that plexus. It passes downward and outward behind the humerus between it and the triceps muscle, lying in the musculo-spiral groove on the posterior surface of the humerus, until it reaches the space between the supinator longus and brachialis anticus and then descends to the outer side of the front of the elbow where it divides into two branches, radial and posterior interosseous. Besides its two terminal branches the musculo-spiral nerve gives off cutaneous branches which supply, on the front of the arm, one the back of the arm and one the back of the fore arm: it also gives branches to the following muscles, triceps, brachialis, anticus, supinator longus, extensor carpi radialis longior and anconeus.

(1). The Radial Nerve.

The radial nerve, derived from the musculo-spiral at the outer side of the front of the elbow, descends the radial side of the front of the fore-arm lying at first too remotely to the outer side of the radial artery to be considered a relation of it: it comes into relation with that artery at the middle third of the fore-arm and lies to its outer side until it reaches the lower third of the fore-arm, some three inches above the wrist, when it crosses the back of the fore-arm by

Post. Intermuscular supplies all mus
on back of fore arm except the following
Musculi Spinal, supinator longus
Extensor carpi radialis long.
And anconeus.

passing beneath the tendon of the *extensor digitorum* and dividing into an outer branch, which supplies both sides of the thumb and an inner branch, which supplies the index, middle and radial side of the middle finger. The radial nerve communicates with the dorsal branch of the axillary nerve on the dorsum of the hand.

(2) The Posterior Intercostal Nerve.

The posterior intercostal branch of the musculospiral nerve immediately pierces the *supinator brevis* muscle to reach the back of the fore arm and then descends between the superficial and deep layers of muscles being distributed to all the muscles of the back of the fore arm except the three supplied by the musculospiral nerve, *extensor digitorum*, *extensor carpi radialis longus* and *anonymus*.

III Posterior Circumflex Nerve

The posterior circumflex arising from the posterior cord of the brachial plexus, winds around behind the surgical neck of the humerus in company with the posterior circumflex artery and is distributed by an upper branch to the deltoid muscle and by a lower branch to the *teres minor* and integument covering the shoulder.

Dorsal Spinal Nerves

The dorsal spinal nerves are twelve pairs; the posterior branches are distributed to the structures of the back, while the anterior cords form the intercostal nerves, and unlike other spinal nerves they do not form a plexus but are distributed separately.

The Intercostal Nerves

The intercostal nerves are the anterior cords of the twelve dorsal nerves deriving their name from their

Cashung for P.C.
H. H. Wilson
W. H. H. H. H.

W. H. H. H.

comes forward between the ribs. The first dorsal nerve
 ascends almost all its bulk to the brachial plexus and
 the fifth usually gives a branch to the lumbar plexus.
 The intercostal nerves are intended for the supply of
 the corresponding organs which they cover and of the integ-
 ument of the front and sides of the thorax and abdomen.
 Each intercostal nerve runs forward on the intercos-
 tal space between the intercostal muscles to near the
 edge of the sternum where it turns forward becoming
 subcutaneous and called anterior. Thence as it is dis-
 tributed to the integument of the front of the chest
 and abdomen most of the filaments passing outward
 in a recurrent course; the six upper nerves appear as
 the anterior cutaneous through the corresponding inter-
 costal spaces while the six lower pierce the sheath of
 the rectus muscle and are called the anterior cutane-
 ous nerves of the abdomen; the six lower nerves after
 reaching the anterior extremity of the intercostal spa-
 ce pass onward between the broad muscles of the ab-
 domen and the last one though called intercostal is
 really not such since it lies below the last rib. Whilst
 running forward the intercostal nerves supply the
 intercostal muscles and the broad muscles of the
 abdomen and about midway its course each nerve gives
 off a branch called lateral cutaneous which divides
 into two, one branch passing forward and the other back-
 ward both being distributed to the integument of the
 side of the chest or abdomen. The first intercostal nerve,
 owing to the fact that most of the cord from which it is
 derived goes to the brachial plexus gives off no lateral
 cutaneous branch and to compensate for this deficiency
 the lateral cutaneous branch of the 2^d nerve is remark-

The Lumbar Plexus

Branches

ilio hypogastric

" inguinal

Ext. Cutaneous

Anterior Cruial

Genito " "

Obturator

communicating branch
to the sacral plexus.

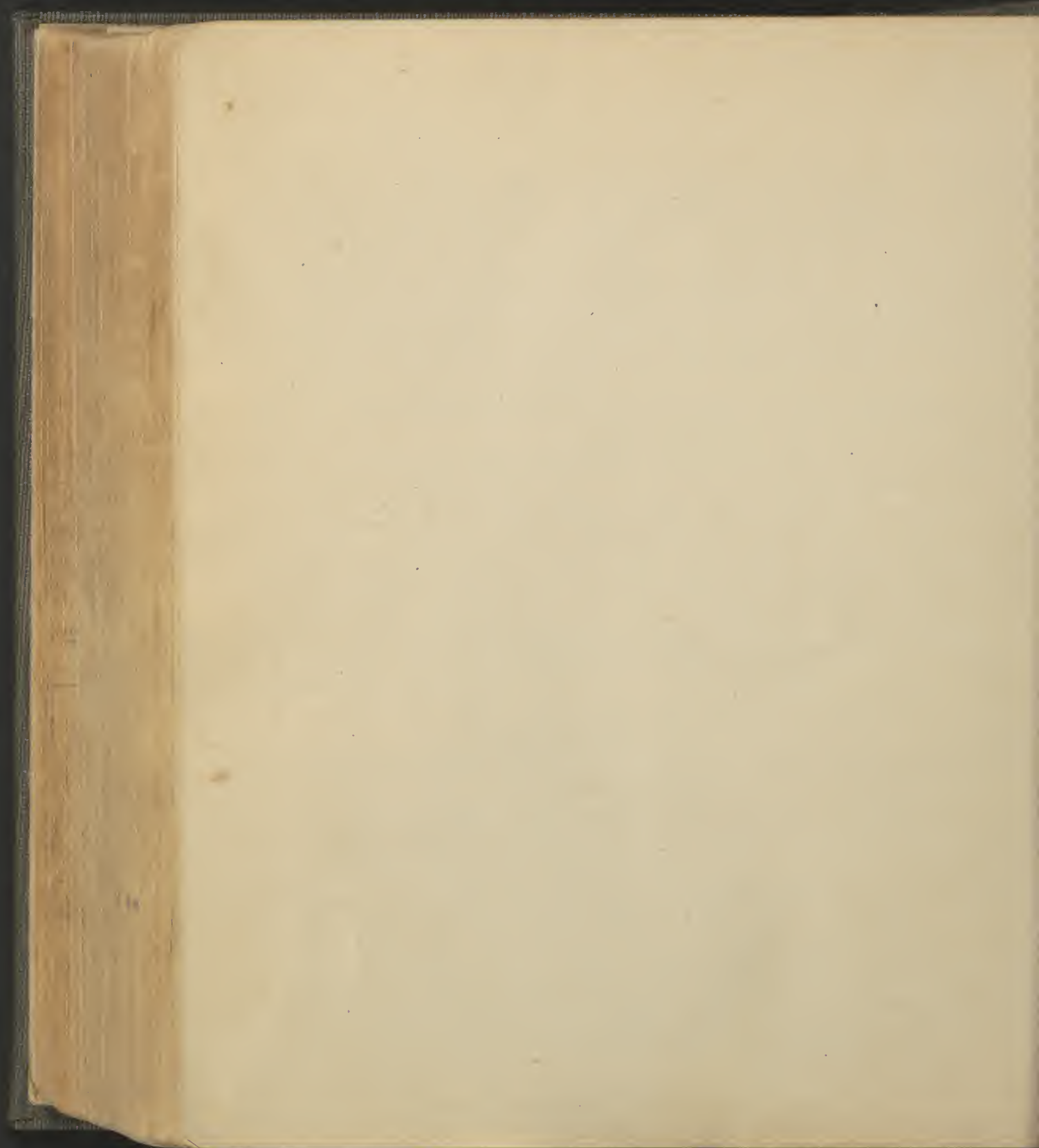
ably large and not only fulfils the office of the lateral cutaneous branches of the 1st nerve and itself but under the name of the intercosto-humeral nerve passes into the axilla communicates with the upper internal cutaneous nerve and is distributed to the integument of the back of the arm and axilla, completely replacing the lesser internal cutaneous. The lateral cutaneous branch of the 12th intercostal nerve and descends over the crest of the ilium and is distributed to the integument of the gluteal region.

The Lumbar Spinal Nerves.

The lumbar spinal nerves are five pairs. The posterior cords supply the structures of the back in their regions and the anterior cords have the following disposition, the upper four with, usually, a branch from the 12th dorsal constitute by their communications the lumbar plexus the 5th having been joined by the communicating branch from the lumbar plexus descends into the pelvis (under the name of lumbosacral) to join the sacral plexus.

The Lumbar Plexus.

The lumbar plexus is formed by the intercommunications of the anterior cords of the four upper lumbar nerves usually aided by a branch from the 12th dorsal nerve. It lies entangled in the back part of the Psoas magnus muscle and behind that muscle. (It is distributed to all the thigh, except the posterior femoral region, to the inner side of the leg and foot and to the lower part of the anterior abdominal parietes). Its branches are seven, ilio-hypogastric, ilio-inguinal, external cutaneous, anterior crural, genito-crural, obturator and the communicating branch to the sacral plexus.



Although this is the order in which the branches appear from the plexus from above downward, it will be more convenient to describe them in a somewhat different order. The first three branches have a course outward and downward one above the other across the posterior wall of the abdomen and disappear from it on its lateral aspect.

I. Ilio-hypogastric Nerve - of 1 Lumbar -

The ilio-hypogastric branch passes outward across the quadratus lumborum muscle to pierce the transversalis muscle and run forward piercing successively the internal and external oblique to become cutaneous just above the external abdominal ring and beside the linea alba and be distributed to the integument of the hypogastric region, having furnished on its route branches to the broad muscles of the abdomen and given off a branch called iliac, which descends over the crest of the ilium to supply the skin of the hip.

II. Ilio-inguinal Nerve - of 1 Lumbar -

The ilio-inguinal branch passes outward parallel with a little below the ilio-hypogastric to pierce the transversalis and then the internal oblique and thus gaining the external abdominal ring escapes to supply the integument of the scrotum and upper part of the inner aspect of the thigh. On its way it gives branches to the broad muscles of the abdomen and communicates with the ilio-hypogastric.

III. External Cutaneous Nerve -

The external cutaneous nerve passes downward and outward across the iliacus internus muscle to escape into the thigh through the notch beneath the anterior superior spinous process of the ilium where after a

com. plex. 590

Remember - !! that the obturator circum-
with the femoral plexus - also N.B. that
the adicular branch passes down on
the adductor Magnus and supplies
the knee joint (hence pain there in
hip joint disease -) it is a branch of
the foot nerve

course of a few inches in the thickness of the fascia lata it becomes superficial and is distributed to the integument of the outer front aspect of the thigh by a posterior branch encircling on the back of the thigh.

- □. Genito-crunal Nerve.

The genito-crunal branch pierces the ~~transversus abdominis~~ muscle from behind forward and then runs down on the front of that muscle to divide just above Poupart's ligament into two branches, genital and crural. The genital branch enters the internal abdominal ring and descends along the spermatic canal to be lost in the cremaster muscle or round ligament. The crural branch passes beneath Poupart's ligament to be distributed to the integument of the front of the thigh as far as the middle.

- Obturator Nerve of 3 & 4 Lumbar.

The Obturator nerve passes forward just below the brim of the pelvis in company with the obturator artery to escape through the upper part of the obturator foramen grooving the under surface of the pubes and divide into an anterior and a posterior branch which are distributed to the adductor muscles of thigh, the three adductors the pectineus and gracilis (i.e. the muscles arising from the pubes and ischium (?)) and to the obturator externus; the posterior branch lies behind the adductor brevis; the anterior branch descends in front of that muscle and is distributed to the integument of the inner side of the thigh and furnishing filaments to a plexiform communication of different nerves over the front of the lower part of the femoral ar.

Anterior Cerebral Nerve.

Branches { Middle Cerebral
 { Anterior " " "
 { " " " Sphenoidal branch

very and called the femoral plexus.

XL. Anterior Crural Nerve.

The anterior crural is the largest branch of the lumbar plexus. It descends in the interval between the iliacus internus and psoas magnus and entering the thigh beneath Poupard's ligament lies about $\frac{1}{4}$ or $\frac{1}{2}$ inch to the outer side of the femoral artery. Almost immediately upon entering the thigh it splits into branches which may be divided into two sets, a ~~superficial~~ cutaneous set and a ~~deep~~ or muscular set. The cutaneous branches are, middle cutaneous, internal cutaneous and internal saphenous.

(1) Middle Cutaneous Branch.

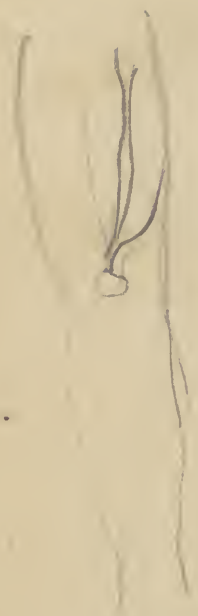
The middle cutaneous branches are distributed to the integument of the front of the thigh to the knee and some of them piercing the sartorius muscle and giving filaments to it.

(2) Internal cutaneous Branch.

The internal cutaneous branch passes inwards over the femoral artery and divides into an anterior and a posterior branch, these being distributed to the integument of the inner front aspect of the thigh, as far as the knee; the posterior branch descends along the posterior edge of the sartorius muscle and pierces the fascia lata about the knee; the anterior branch becomes superficial about the lower third of the thigh.

(3) Internal Saphenous Branch.

The internal or long saphenous nerve descends in close



101.
102.
103.
104.
105.

contact with the outer side of the sheath of the femoral vessels to their termination and then descends between the sartorius and gracilis muscles continuing its course down the inner side of the leg in front of the ankle and along the inner side of the foot as far as the great toe, being distributed to the integument of the inner side of the leg, inner side of the foot and inner side of the great toe.

The long saphenous furnishes filaments to the femoral plexus (side obturator nerve), the elements of which are derived from it, from the obturator and from the internal cutaneous. Just above the knee the long saphenous gives off a branch called cutaneous, plexellae which is joined by filaments from the external, middle and internal cutaneous nerves to form an intricate inter communication over the front of the patella called the plexus patellae.

Muscular Branches of the Anterior Crural Nerve.

The muscular branches of the anterior crural nerve are distributed to the anterior femoral muscles i.e. the rectus, and the two vasti, and sometimes to the pectineus. The sartorius is supplied by the middle cutaneous branch as they pierce it, and the tensor vaginæ femoris is supplied by the gluteal branch of the crural plexus.

VII. Communicating Branch.

The communicating branch joins the anterior cord of the fifth lumbar nerve and descends into the pelvis to aid in forming the sacral plexus - by the name

Sacral plexus
gluteal
Int. Pudic.
Less Sacratæ
Greater " " "

of Lumbo-sacral.

The Sacral Plexus.

The sacral plexus is formed by a fusion of the lumbo-sacral nerve and the anterior cords of the three upper sacral nerves with half the anterior cord of the fourth sacral. This plexus differs from others in this that it is not a simple intercommunication of the elements, but gets a broad continuous band. The plexus extends from its base formed by its roots downward and outward to the great sciatic foramen where it divides up into its four terminal branches. It lies on the lateral front face of the sacrum and on the front of the pyriform muscle. The distribution of the plexus is to the viscera and walls of the pelvis, to the gluteal region to the lower femoral region, to all of the leg except the inner side and to all the foot except the inner side and to all the toes except the inner side of the great toe.

Branches.

Besides its four terminal branches the sacral plexus produces a set of visceral branches to the pelvic viscera which are in part supplied by branches derived from that portion of the fourth sacral nerve which does not enter into the plexus, and a second set to muscles, these being the levator ani and all the outward rotators of the thigh except the obturator externus which gets its nerve from the obturator.

The four terminal branches of the plexus are (superior) Gluteal, Internal Pudic, Lesser Sciatic and Greater Sciatic.

Glacial River above P-

Below
Glacial River, P-

Some rocks in distribution to the west
of Parnum & by an ash bench near forest
& supply of Parnum & sandstone also
minerals in its course.

I. Gluteal Nerve-

The (superior) gluteal nerve comes off from the upper part of the sacral plexus and leaves the cavity of the pelvis (through the greater sacro-sciatic foramen) ~~above~~ the piriformis muscle and divides into two branches which ramify between the gluteus medius and minimus being distributed to these two muscles and by its terminal filaments to the tensor vaginæ femoris-

II. Internal Pudic Nerve-

The internal pudic nerve arises from the lower part of the plexus and leaves through the greater sacro-sciatic foramen below the piriformis muscle crosses the spine of the ischium and re-enters through the lesser sacro-sciatic foramen dividing into two branches, a superior or dorsalis penis and a ~~perineal~~ ~~perineal~~ perineal: having emitted before dividing the inferior hemorrhoidal branch which is distributed to the sphincter ani and integument around the anus-

(1). Dorsalis Penis Nerve-

The dorsalis penis branch passes upward and forward along the ramus of the ischium and pierces the suspensory ligament of the penis continuing its course forward on the dorsum of the penis supplying the integument and corpus cavernosum and terminates in the glans penis. It gives off a lateral cutaneous branch to the side of the organ-

(2). Perineal Nerve-

The perineal branch divides into two sets of branches



What structure pass through the acetabulum

Supplies the Glutens Maxima.

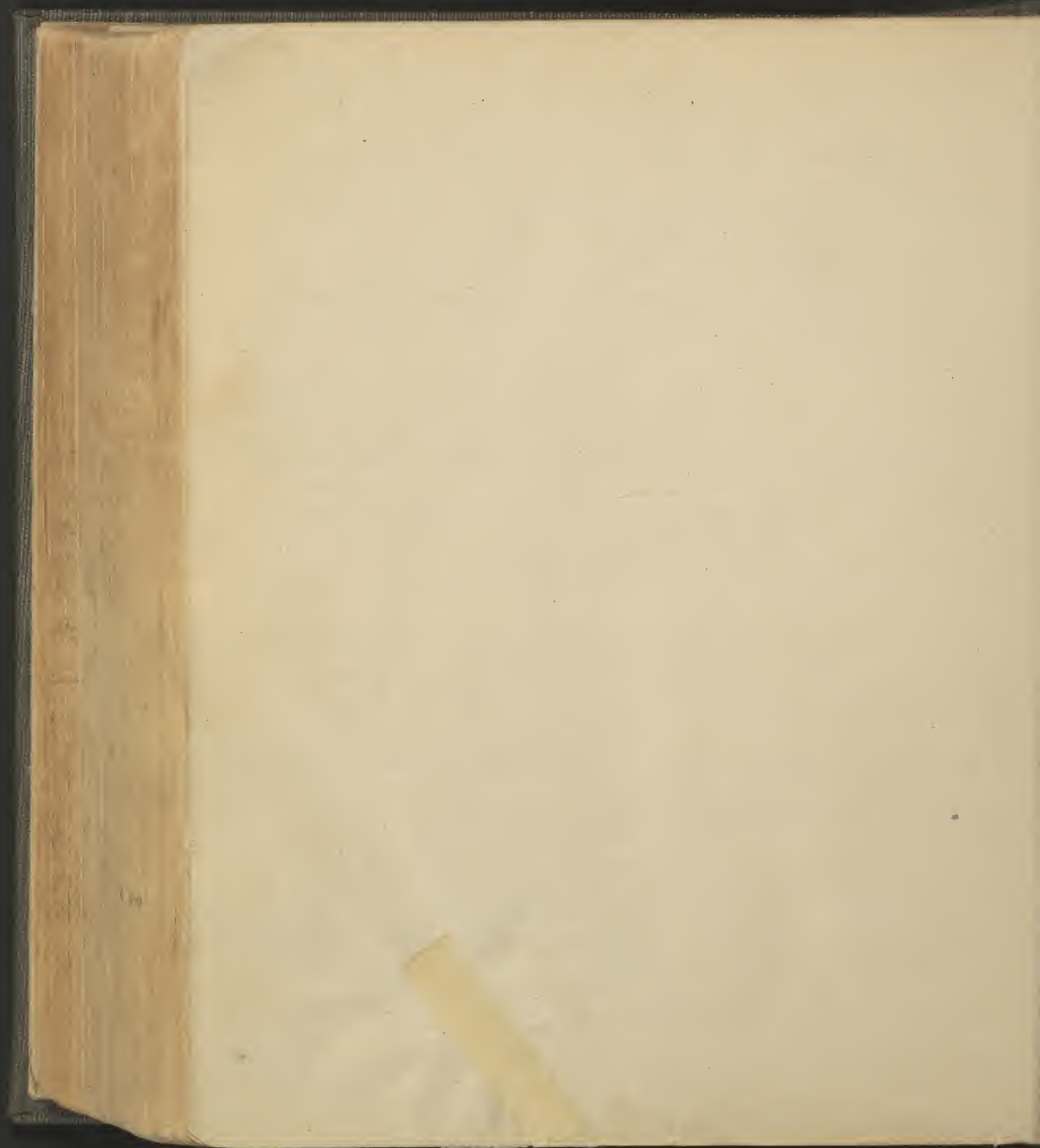
cutaneous and muscular. The cutaneous branches are two anterior and posterior and pass forward being distributed to the integument of the perineum scrotum and under surface of the penis. The muscular branches are distributed to the muscles of the perineum, viz. transversus perinei, erector penis, accelerator urinae and compressor urethrae. Several of the deep filaments also supply the corpus spongiosum.

III. Lesser Sciatic Nerve.

The lesser sciatic nerve usually arising by two roots, escapes through the lesser sacro-sciatic foramen below the hypogastric muscle along with but superficial to the great sciatic nerve, and descends the middle of the back thigh beneath the fascia lata to terminate on the back of the upper part of the leg.

Branches.

The branches of the lesser sciatic are chiefly cutaneous but it supplies one muscle the glutæus maximus. The cutaneous distributions comprises the filaments distributed to the integument in the downward course of the nerve on the back of the thigh and upper back part of the leg and may be called descending cutaneous branches. Secondly it sends cutaneous branches upward to the integument of the lower portion of the glutæal region and these are known as ascending cutaneous. Thirdly it gives off internal or perineal cutaneous branches which supply the integument along the inner posterior aspect of the thigh; one of these is known as the inferior pudendal.



nerve which curves upward and forward to communicate with the perineal branches of the internal pudic and aid in supplying the integument of the perineum -

IV. Great Sciatic Nerve -

The great sciatic is the largest nerve in the system, and seems a continuation of the plexus through the greater sacro-sciatic foramen below the piriformis muscle being the last of the structures which have to be traced through that aperture, there are eight in number the piriformis muscle being the bulkiest and almost filling the foramen besides it four nerves and three arteries emerge through the opening, one artery and nerve above the piriformis muscle, viz, the gluteal artery and nerve, and two arteries and three nerves below the muscle, viz, the internal pudic and ischiatic arteries and the greater and lesser sciatic and internal pudic nerves -

After escaping the great sciatic nerve descends the middle of the back of the thigh, lying on the adductor magnus muscle beneath the biceps and separated by it from the lesser sciatic to divide usually at the upper angle of the popliteal space into the internal and external popliteal nerves. Sometimes the great sciatic divides before it reaches the point designated and its two terminal branches may even come off separately from the sacral plexus. Before dividing it gives off branches to the posterior femoral muscles and adductor magnus -

(1) Internal Popliteal Nerve - ✓

comes from in the middle of 1846. Pace.

The internal popliteal descends through the stability-
 ent space to pass beneath the tendinous arch of the
 soleus muscle and there becomes the posterior tibial
 nerve. It is a relation of the popliteal artery lying
 for the upper two thirds of the popliteal space.
 superficial and external to the artery and then crossing
 superficially to its inner side which relation it main-
 tains until both terminate.

Branches-

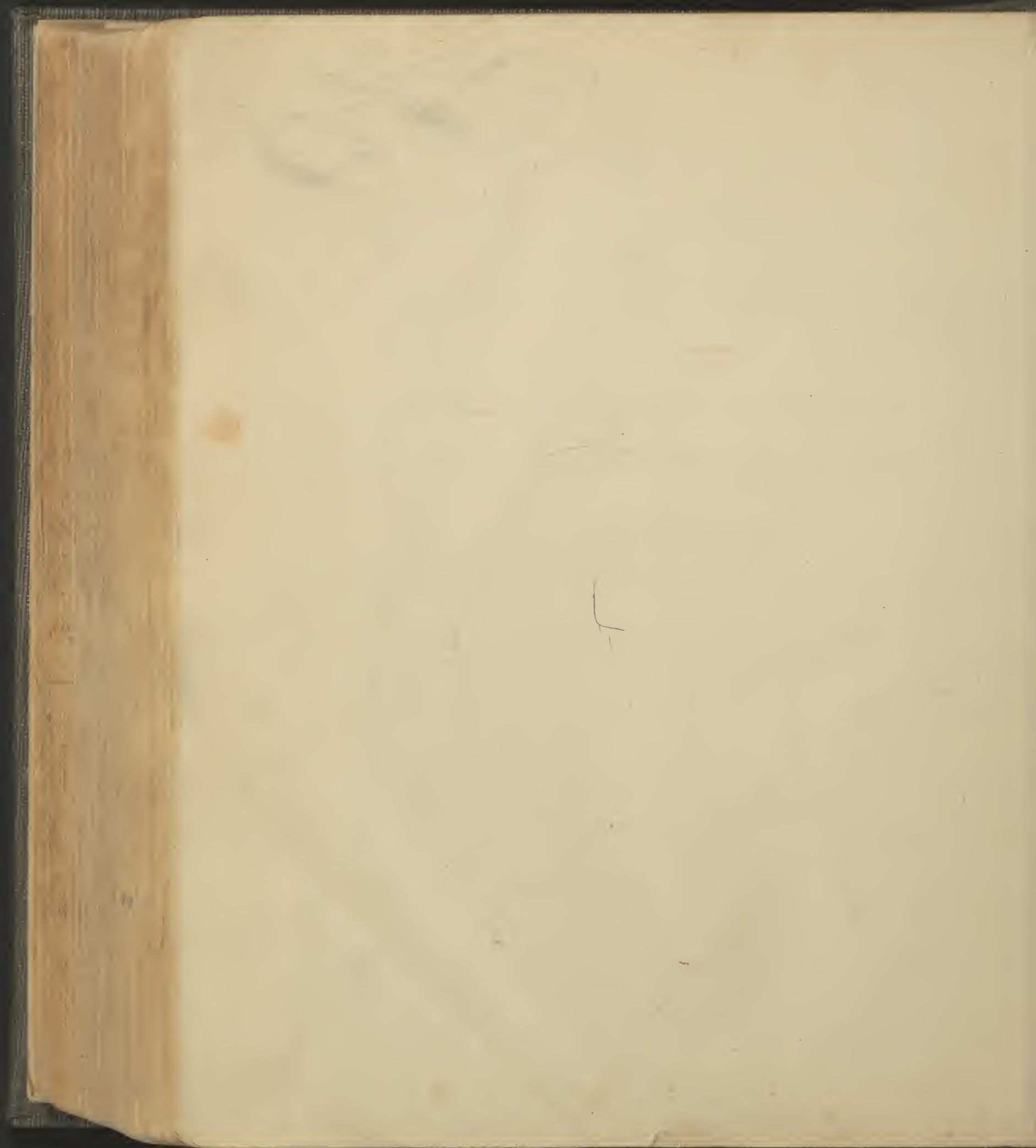
The external popliteal nerve gives off muscular
 branches to the biceps urae and to the popliteus
 muscle. Besides these it produces a cutaneous branch,
 external saphenous.

The External Saphenous Nerve-

The external or short saphenous nerve descends from
 the internal popliteal in company with the ex-
 ternal saphenous vein lying first in the groove be-
 tween the two heads of the gastrocnemius muscle
 then beside the outer edge of the tendo Achilles and
 passing behind the external malleolus runs for-
 ward on the outer side of the dorsum of the foot to
 the little toe. About the middle of the back of the leg
 it is joined by a branch from the external popliteal
 nerve called communicans peronei. The external
 saphenous is distributed to the integument of the
 outer side of the heel, outer side of the dorsum of the
 foot and outer side of the little toe.

Posterior Tibial Nerve- ✓

The posterior nerve, the continuation of the internal



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Huntington Dr
400
popliteal, begins at the tendinous arch of the soleus, descends the back of the leg lying beneath the triceps crurae and terminates between the internal malleolus and tendo Achillis by dividing into the internal and external plantar nerves. The posterior tibial nerve is a companion of the posterior tibial artery lying at first to the inner side of the artery, but crossing it superficially after a course of a few inches to preserve thenceforth a relation to its outer side.

- Branches -

Besides its terminal branches the posterior tibial nerve gives off muscular branches to the deep layer of muscles on the back of the leg except the popliteus and a cutaneous branch (internal calcanean) to the integument of the heel.

- The Internal Plantar Nerve - ✓

The internal plantar nerve runs forward between the abductor pollicis and flexor brevis digitorum and divides into branches (4) which are distributed as, digital branches to the great toe the second toe, the third toe and inner side of the fourth toe. Besides these the nerve emits cutaneous branches to the integument of the inner side of the sole and muscular branches to the muscles in its course, viz. Abductor pollicis, flexor brevis pollicis and flexor brevis digitorum; the digital branches furnish filaments finally to the two inner annulrcales.

- The External Plantar Nerve - ✓

runs under the flexor brevis
digitorum and abductor mini-
digit.

James L. Mann

The external plantar nerve takes the course of the ~~523~~ external plantar artery, running first outward on the ~~musculus~~ *musculus accessorius* and then forward between the *flexor brevis digitorum* and *abductor minimi digiti* it divides into two digital branches which supply the little toe and outer side of the fourth toe. This digital distribution is exactly similar to that of the ulnar nerve in the hand while that of the internal plantar is the counterpart of that of the median. Besides its digital branches the external plantar gives filaments to the integument of the inner side of the sole, gives branches to the muscles in its course, viz, *musculus accessorius*, *abductor minimi digiti*, *flexor brevis minimi digiti*, two outer lumbricales and two outer interossei, sends a communicating branch to the internal plantar nerve and last gives off a branch which accompanies the plantar arch and supplies the *adductor pollicis*, *transversus pedis* and the interosseous muscles except those in the outer metatarsal space.

(2) External Popliteal Nerve. ✓

The external popliteal nerve very much smaller than the internal popliteal passes outward and downward from its origin as one of the two terminal branches of the great sciatic, crossing the outer head of the *gastrocnemius* muscle it enters the substance of the *peroneus longus* and just below the head of the fibula divides into two branches, anterior tibial and musculo-cutaneous.

The above was supplied 1/2 in front
" " " 2 1/2 in back

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the right Blank 1 1/2 in back

Manuscript of poet

Dr. Oath. in note 1 p. 10

- *Terminals* -

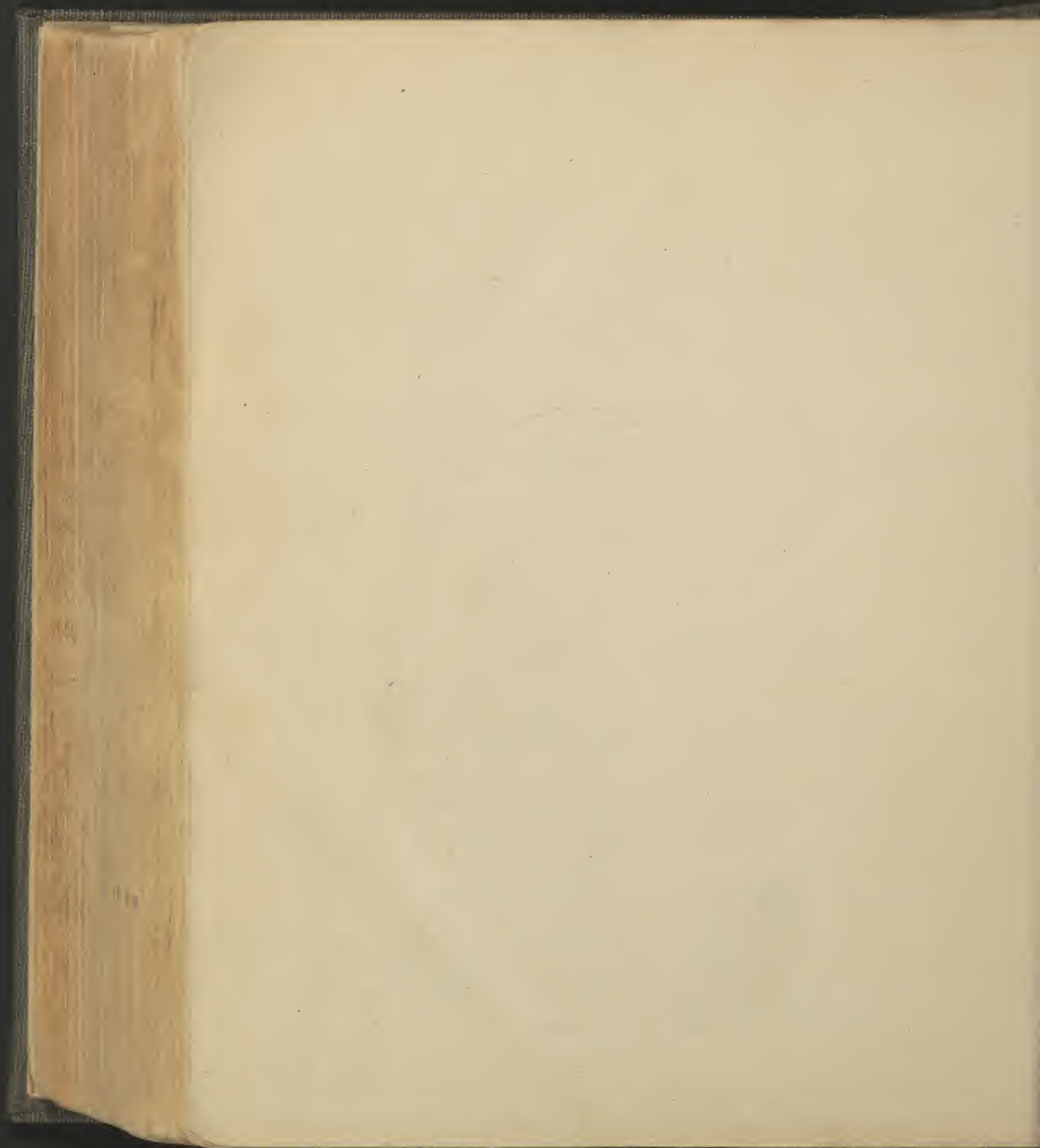
Besides its terminal, the external popliteal emits cutaneous filaments to supply the integument of the outer side of the leg and a communicating branch to the external saphenous which is called *communicans peronei*, the external popliteal being merely known as the peroneal nerve.

- *Communicans Peronei* ✓

The *communicans peronei* leaves the external popliteal nerve near the head of the fibula, and crossing downward and inward on the back of the leg joins the external saphenous about the middle of the leg having given filaments to the integument in its course.

1st Anterior Tibial Nerve. ✓

The anterior tibial branch of the external popliteal nerve passes inward through the fibres of the *extensor digitorum* muscle to gain the outer side of the anterior tibial artery with which it descends the front of the leg lying first to the outer side of the artery on the interosseous membrane then in front of the artery and again to the outer side lying now on the front of the tibia; having thus reached the termination of the anterior tibial artery it passes forward on the dorsum of the foot lying to the outer side of the *dorsalis pedis* artery and where that artery terminates, at the base of the first metatarsal space it also divides into two branches which supply the adjacent sides of the great and second toes on the dorsal aspect.



Branches-

Besides its two terminal digital branches the anterior tibial nerve produces muscular branches to the muscles on its course viz, those of the anterior tibial region and the extensor brevis digitorum, the latter muscle being supplied by a branch which passes outward on the tibia to be distributed to it and the articulations.

2d The Musculo-cutaneous Nerve - 44

The musculo-cutaneous nerve the second terminal branch of the external popliteal, descends in and among the muscles of the outer region of the leg, lying first on the peroneus longus then between it and the peroneus brevis then between the two peronei, and the extensor digitorum and at the lower third of the outer aspect of the leg pierces the deep fascia and thus becoming superficial is distributed to the dorsum of the foot by two branches (inner and outer) not only supplying the integument of the dorsum of the foot but giving digital branches to adjacent sides of the 1st, 2d, 3d, 4th, 4th & 5th toes - (The inner branch giving off a twig which aids the articular saphenous in supplying the inner side of the great toe) whilst, coursing among the peronei muscles it also gives branches to those two muscles - END

- Nervous Supply to Dorsum of Foot.

The nervous supply of the dorsum of the foot is chiefly derived from the musculo-cutaneous but it is aided on the inner side of the dorsum and on

Placements of the Sympathetic
3 Cervical
12 Dorsal
4-5 Lumbar
4 Sacral-

Branches of the Ganglion
1st are ascending
2nd are descending
3rd are External - Spinal nerves
4th are internal (death)

The outer side of the dorsum and outer side of the little toe are supplied by the external saphenous; while the adjacent sides of the great and second toes are supplied by the termination of the anterior tibial.

4th, 5th & 6th Sacral Nerves.

The fourth sacral nerve sends half its bulk to aid in forming the sacral plexus, of the other half a part goes to furnish visceral branches to the pelvic viscera and a part aids the small and important fifth and sixth sacral nerves in supplying the coccygeus and levator ani muscles and the integument over the coccyx between it and the anus.

Sympathetic Nerves.

The sympathetic nervous system consists of a vertebral and cranial portion.

The Vertebral Portion of the Sympathetic.

The vertebral portion of the sympathetic consists of two similar series of ganglia lying one on each side of the vertebral column extending from the skull to the coccyx and of the nerves which are connected with these ganglia. Of these ganglia there are about twenty-four and they are divided into cervical, of which there are three, dorsal, of which there are twelve, lumbar, of which there are four or five, and sacral of which there are about four. Each ganglion is provided with four sets of branches, the 1st are ascending branches to connect it with the ganglion above, the 2^d are descending, to connect it with the ganglion below, the 3^d are external to connect it with a contiguous

Phases of Prevertebral Symp-
cardiac, solar, Hypogastric

Superior, middle & inferior ganglia

Superior - in the 2nd & 3rd
Cervical vertebra

spinal nerve and the 4th are internal or branches of distribution. The first three sets of branches are the communicating branches and each of the connections, indications, viz. with the ganglion above, the ganglion below and the spinal nerve, is effected by two filaments one of which is gray and the other white. The fourth set of branches, the internal or distributing, pass as a rule, inward and forward to supply the organs of their various regions; these branches going either singly to their destinations or as in some cases several branches from one side meet similar ones from the opposite side and communicating with them on the front of the vertebral column from plexuses, and from these branches of distribution proceed, three such plexuses exist and are known as the cardiac, solar and hypogastric - these constituting what is called the praevertebral sympathetic. As a rule each ganglion is connected with but one spinal nerve, but to this there are exceptions since there are thirty one spinal nerves and but twenty-four ganglia these exceptions will be found in the clinical portion.

- Cervical Portion -

The cervical portion of the sympathetic is that part of the sympathetic chain or trunk which is found in the cervical region. Although there are here eight cervical spinal nerves there are only three sympathetic ganglia these being known as superior, middle and inferior respectively.

- Superior Cervical Ganglion -

The superior cervical ganglion lies on the front lateral aspect of the 2^d 3^d cervical vertebral being of a fusiform shape and pinkish color. Its external branches connect it with the first four

Is connected with the 1st & spinal
nerves and the glossopharyngeal
Pneumogastric
Hypoglossal

Branches of distribution
Pharyngeal
Laryngeal
Superior Cardiac { Sup
mid
inf

Cervical ganglion middle
on the 5th cervical vertebra
its external branches connect
with the 5th and 6th cr. Spinal N.

Branches of distribution are
Middle Cardiac & Thyroid

cervical spinal nerves and also with three of the cranial nerves, viz, glosso-pharyngeal, pneumogastric and hypoglossal.

Its ascending branches pass up along the internal carotid artery, one on the inner side of that vessel to form in the cavernous sinus by communications the cavernous plexus; the other on the outer side of the carotid by communications along that artery forms the carotid plexus.

Its descending branches connect it with the middle cervical ganglion.

This ganglion gives off branches from its front face which thine around the external carotid artery and are called *neri molles*.

The internal branches or branches of distribution of this ganglion are three as follows.

- 1st Pharyngeal, which joins in the pharyngeal plexus before mentioned (vide Vol VI. p.)
- 2^d Laryngeal, which distributed to the larynx,
- 3^d Superior Cardiac, which is distributed to the heart in a manner which will be hereafter explained, this is called superior cardiac because the three cervical ganglia each give off a cardiac branch, these being distinguished as superior, middle and inferior.

Middle Cervical Ganglion.

The middle cervical ganglion is situated opposite the 5th cervical vertebra, is small and sometimes altogether wanting.

Its external branches communicate with the 5th & 6th cervical spinal nerves.

Its ascending and descending branches connect it with the superior and inferior cervical ganglia respectively.

Its branches of distribution are two.

- 1st Middle cardiac, 2^d Thoracic, which joins the inferior

Inferior Cervical lies opposite
the 7th cervical vertebra

Its external branches communicate
with the 7th & 8th cervical Spinal
nerves

Branches of ductus tuba

Inferior Cardiac
one forming a plexus around
the ventral aorta.

Cardiac Plexuses

Superficial in situ on the ductus Arteriosus
Deep - Representation of Viscera

thyroid artery just where it makes its inward turn and accompanies it to the thyroid gland.

- Inferior Cervical Ganglion -

The inferior cervical ganglion lies opposite the 7th cervical. Its external branches connect it with the 7th & 8th cervical spinal nerves.

Its ascending branches bring it into connection with the middle cervical ganglion.

Its descending branches are to the 1st Thoracic ganglion.

Its branches of distribution are two.

1st Inferior Cardiac; 2^d A branch which comes off from the outer side of the ganglion and forms a plexus along the vertebral artery.

- The Cardiac Nerves -

The cardiac branches from the cervical sympathetic are three on each side, superior, middle and inferior, proceeding from the respective ganglia they descend into the thorax and form the cardiac plexus, the first of the praeventral plexuses.

The cardiac plexus consists of two portions a superficial or the lesser cardiac plexus and a deep or the greater cardiac plexus.

The superficial portion is found on the ductus arteriosus, is quite small and often contains a mass of ganglionic matter (called the cardiac ganglion) It is formed by the superior cardiac nerve of the left side and by the cardiac branches of the left pneumogastric nerve.

The deep portion very much larger than the superficial is situated in the bifurcation of the trachea & is formed by the three cardiac nerves of the right side and the middle and inferior cardiac nerves of the left side with the cardiac branches of the right pneumogastric. From these two portions which are connected by a communicating branch, filaments descend to the heart.

12 ganglia each on the front of a rib

forming along the anterior coronary artery the anterior coronary plexus and along the posterior coronary plexus.

—Thoracic or Dorsal Sympathetic—

The dorsal portion of the sympathetic consists of twelve ganglia on each side connected by ascending and descending branches to contiguous ganglia.

Each ganglion lies on the front of the head of a rib and besides its ascending and descending branches of communication is connected by its external branches with one neighboring dorsal spinal nerve.

The internal branches of the dorsal ganglia have the following disposition—Those from the upper five ganglia (about) are furnished to the aorta and oesophagus giving a few filaments to the lungs and heart;

the internal branches from the lower seven dorsal ganglia descend to the abdomen as they are not needed in the thorax; in doing so they form what are called the splanchnic nerves, whose formation and destination are as follows. The internal branches from the 6th, 7th, 8th, 9th and part of that from the 10th dorsal ganglia unite successively to form a large cord called the great splanchnic nerve which pierces the crura of the diaphragm and terminates in a ganglionic body called the semilunar ganglion, the two semilunar ganglia right and left surround the aortic arch and give off an immense number of branches which radiating like the rays of the sun constitute the solar plexus. The internal branch of the 11th dorsal ganglion and part of that of the 10th unite to form the lesser splanchnic nerve which descends piercing the diaphragm to terminate in the semilunar ganglion of that side. The ma-

Branches of *Samolus* *polyneura*
(*Samolus* *polyneura*)

Murice

Lactuca

Hepatica

Splachne

Supra Pseud

" "

Supra concavata

Spermatoph

Inf. Concavata

Portia

One of the twelfth dorsal ganglia usually
a branch from the lesser splanchnic from the
autonomic nerve which proceeds to the kidney.
The distribution of the semilunar ganglia
the solar plexus are intended to supply the
viscera and walls; the nerves proceed along
leading to any viscera and are known as a
long the course of the artery it accompanies.
are consequently as many as the arte-
rials -

accompanying the chronic artery, to
signe.

being a company in the common pastus arte-
linach.

librarian accompanying the artist, as they to the

" splenic to the spleen
 " bronchial " trachea
 "

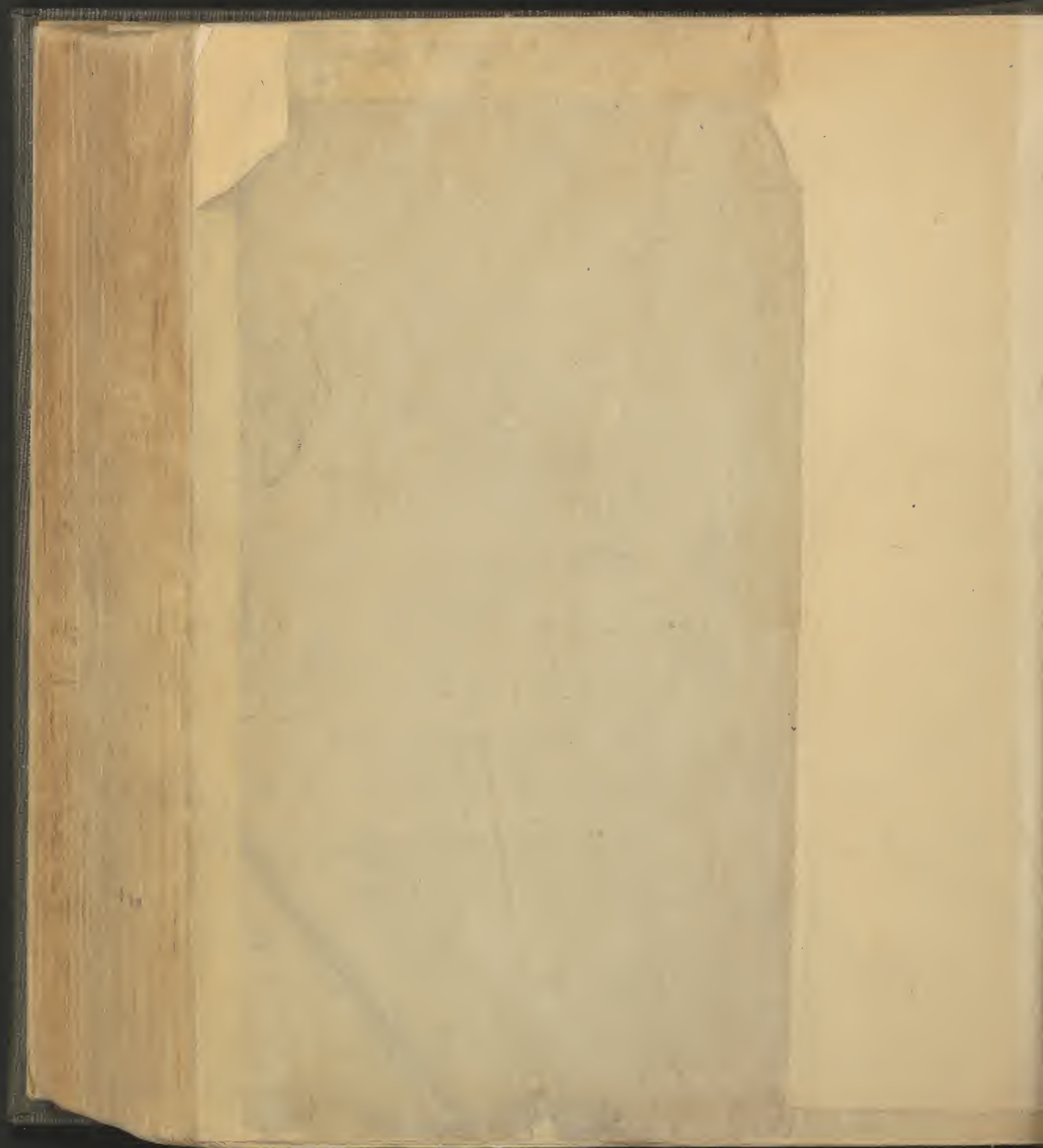
venae accompanying the. Renal artery to the

anastomotic plexus accompanying the superior artery to the small intestine.

plexus accompanying the spermatic arte-
ries.

mesenteric plexus accompanying the inferior
 meso-artery to the large intestine.

the pleura which descends along the aorta
producing by most of its bulk the inferior
pleura. Enters into the pelvis to aid
in a pressure. Interal pleura on the front of the
known as the hypogastric.



The cranial and upper-cranial plexuses are seen for the large size and number of their nerves, the receiving some fifteen large filaments.

The Lumbar Sympathetic.

The lumbar portion of the sympathetic system is continuous above with the dorsal by means of branches which pass beneath the ligamentum arcuatum intermedium, inferiorly its descending branches communicate with the sacral portion. Besides the ascending and descending branches each ganglion of which there are some four or five found lying along the course of the posterior margin, has external branches to the lumbar spinal nerves. Of the internal branches the upper part joins the aortic plexus and the lower descend to the front of the promontory of the sacrum where they join the hypogastric plexus which is distributed to the pelvis by plexus accompanying the branches of the internal iliac artery.

Sacral Sympathetic.

The sacral portion of the sympathetic consists of four or five ganglia with the usual communicating branches and branches of distribution to aid the hypogastric plexus in supplying the pelvic viscera.

The ganglia lie on the front lateral aspect of the sacrum near the anterior several foramina, the ganglia of each side merging below until the last pair meet on the middle and fuse into one called the ganglion corpus.

The Cervical Sympathetic.

The cervical portion of the sympathetic consists of four ganglia lying on and around the skull with their branches of communication and distribution.



of the carotid and cavernous plexus.
Ascending branch of the superior cervical
Each cranial ganglion will be found cr. n.
with two cranial nerves, or two branches of the 2^d
cranial nerve, receiving from one a motor branch
and from the other a sensitive branch and is also con-
nected with the rest of the sympathetic system by a
communicating branch, these various communica-
ting branches forming the roots of the ganglion. The
four cranial ganglia are, the ophthalmic, the sphenos-
palatine, the otic and the submaxillary.

- Ophthalmic Ganglion.

The ophthalmic or lenticular ganglion is found in
the orbit lying on the outer side of the optic nerve
close to the optic foramen.

Its sensitive root is furnished by the nasal nerve;
its motor root by the branch of the 3^d nerve sent to
the inferior oblique muscle; its sympathetic root by
the cavernous plexus.

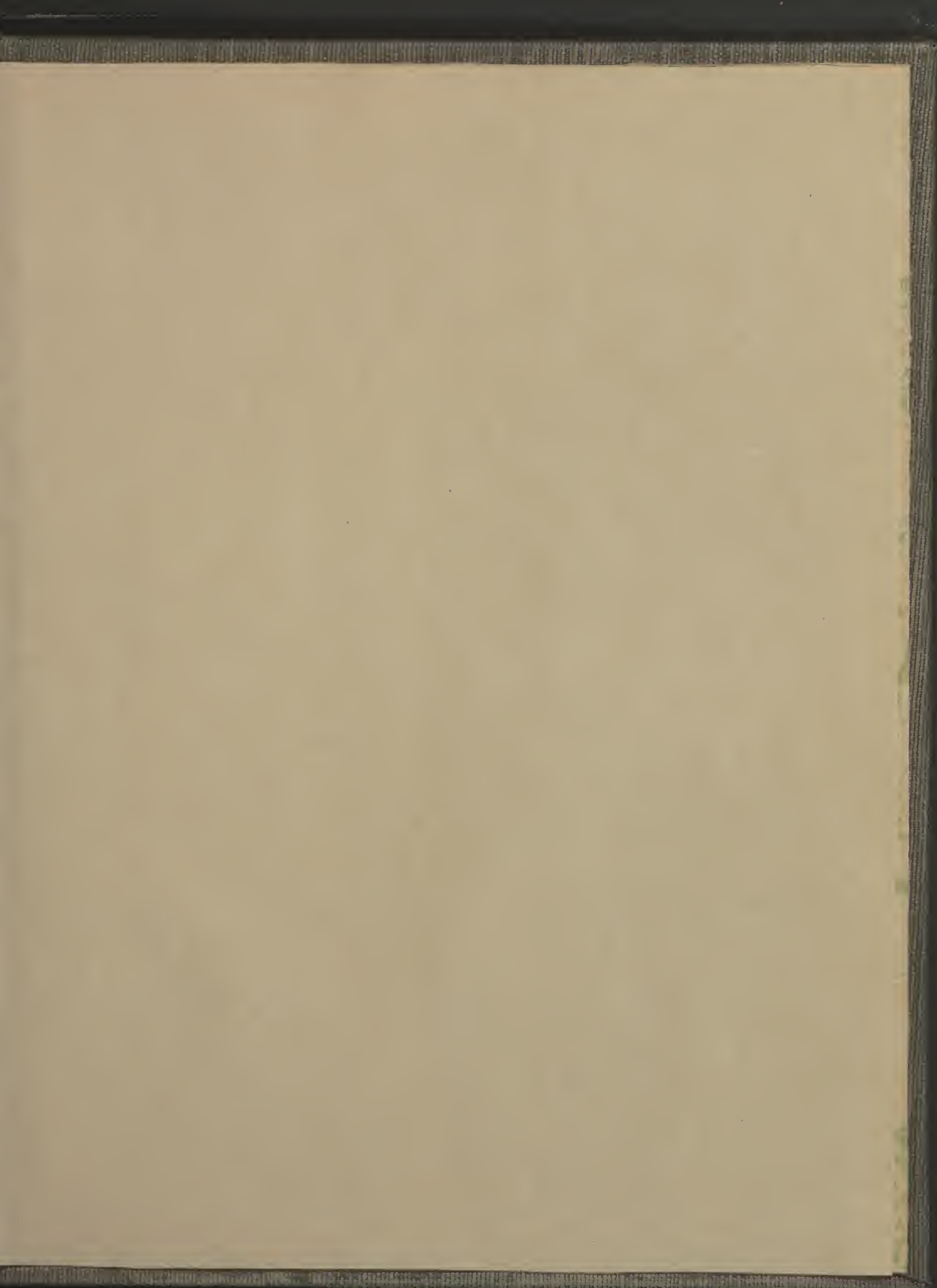
Its branches of distribution, known as ciliary nerves
5 or 6 in number pierce the sclerotic coat proximal
to the optic nerve and ramifying between the tunics
of the eyeball terminate in the iris.

- Sphenos-palatine Ganglion.

The sphenos-palatine or Meckel's ganglion is the largest
of the cranial ganglia lying in the sphenos-
maxillary fossa just beneath the superior maxillary
artery.

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